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ABSTRACT

This curriculum guide is designed to assist vocational educators in presenting an articulated, performance-based course in masonry and bricklaying. Addressed in the individual units of the course are the following topics: safety, leadership, job communications, career preparation, desirable learning and work habits and attitudes, basic math skills, basic measurement, masonry tools and equipment, blueprints, mortar, bricklaying, blocklaying, pointing, jointing, site preparation, foundations and footings, chimneys and fireplaces, brick construction techniques, concrete masonry, commercial and decorative brickwork, and masonry shop projects. Each unit contains suggested instructional times, task listings, and criterion-referenced tests. Also included in the guide are an outline of South Carolina Department of Education recommendations for bricklaying and masonry programs and a discussion of similarities between secondary and postsecondary education. Appendixes to the guide include sample articulation agreements, a list of definitions, a discussion of the philosophy and purposes of the articulation guide, directions for the tests, and an analysis of secondary instructional times. (MN)

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ARTICULATED, PERFORMANCE-BASED INSTRUCTION OBJECTIVES GUIDE
FOR
MASONRY (BRICKLAYING)

DEVELOPING PERIOD
JULY, 1983 - JUNE, 1984

PREPARED BY
OCCUPATIONAL EDUCATION ARTICULATION PROGRAM
TASK FORCE COMMITTEE
FOR
MASONRY (BRICKLAYING)
REPRESENTING
THE SCHOOL DISTRICT OF GREENVILLE COUNTY
AND
GREENVILLE TECHNICAL COLLEGE
GREENVILLE, SOUTH CAROLINA

PUBLICATION OF
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OF THE SCHOOL DISTRICT OF GREENVILLE COUNTY
AND GREENVILLE TECHNICAL COLLEGE

CE039313

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ARTICULATED, PERFORMANCE-BASED CURRICULUM GUIDE

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ARTICULATION GUIDE

THE SCHOOL DISTRICT
OF GREENVILLE COUNTY
AND
GREENVILLE
TECHNICAL COLLEGE

THE SCHOOL DISTRICT OF GREENVILLE COUNTY
GREENVILLE, SOUTH CAROLINA

1984

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ACKNOWLEDGEMENT

The Articulated, Performance-based Instruction Objectives Guide for Masonry (Bricklaying) is the product of the work of the following instructor Task Force Committee participants representing the secondary programs of The School District of Greenville County and the post-secondary similar program at Greenville Technical College.

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Many ideas and models, however, have evolved from years of research and experience and often are difficult to precisely credit.

The objectives and task actions of the articulated guides are developed or contributed by task force committee (instructor) participants based on their expertise and on task lists from resources such as V-TEC Catalogs. Standards included in guides are those identified by local potential employers as important to the success of entry level workers. Sample knowledge and performance tests are included to represent valid and reliable test items that may be used to measure mastery of objectives. Test samples taken from texts or workbooks typically are those being used locally and appropriate documentation has been included.

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Wm. Edward Henderson Jr., Coordinator
Occupational Education Articulation Program
The School District of Greenville County
and Greenville Technical College
1983

ABSTRACT

Title of Program: Occupational Education Articulation Program

Program Coordinator: Wm. Edward Henderson Jr.

Sponsoring Agencies: The School District of Greenville County
and Greenville Technical College
c/o P.O. Box 2848 - 301 Camperdown Way
Greenville, SC 29602

Program Development Period: July 1, 1983 through June 30, 1984

PURPOSE: To develop a continuous line of vocational training in similar Masonry (Bricklaying) programs so that students may continue their career/vocational education at the secondary and post-secondary levels without loss of time or waste of effort in repeating tasks that have been mastered previously.

To provide a system where teachers can cooperate effectively in providing a continuous occupational development program where the level and type of training that leads to entry-level employment skills will be clear to students, teachers, other educators, and potential employers.

METHOD: Masonry (Bricklaying) instructor representatives from the four secondary level career centers of The School District of Greenville County and the post-secondary level Masonry (Bricklaying) Department Head from Greenville Technical College were brought together in task force committee meetings and workshops to survey very similar areas of vocational training to identify possible overlaps or gaps as students continue masonry training from the secondary level to post-secondary level. In addition, lateral articulation of masonry programs at the secondary level was promoted.

This Articulated, Performance-based Instruction Objectives Guide for Masonry, was developed by the

Task Force Committee on Masonry to faciliate articulation. The Task Force Committee, by the task analysis process, identified the minimum essential competencies for the secondary masonry graduate to continue training at the next higher level of labor market in the trade. Major objectives for competency were stated, performance to obtain the objectives were clarified, enabling actions were identified and placed in sequential order, instruction time was estimated, and performance standards were stated. Finally, outcome-referenced (criterion-referenced) measures of performance were developed as a guide in articulating (articulation).

RESULTS: As a result of the project development phase, the Articulated, Performance-based Instruction Objectives Guide for Masonry was developed. This articulation guide, however, is not a final product since it must be field trial tested and revised. Modifications and improvements to the guide are expected since the process of education must be continually reviewed to ensure that objectives are valid and are being met as best they can be met under given conditions.

Prior to development of this articulation guide, an Articulation Policies and Procedures Guide was developed to aid articulation activities and was used to direct program and product (guide) development activities.

Workshop guides, developed and refined during an earlier phase of the program, were used to assist task force committee participants in obtaining task analysis data, writing performance-based objectives, identifying performance actions to reach the objectives, stating performance standards, and developing outcome-referenced tests. These how-to-do-it guides are usable at the instructional level as well as at the supervisory level.

PREFACE

This Articulated, Performance-based Instruction Objectives Guide is based on the following ASSUMPTIONS:

1. The grouping of tasks is more conducive to skill development in vocational education.

2. Potential employers probably would prefer an employee well educated in the basics with more detailed on-the-job training provided by the employer.

3. Among topics that should be included in vocational education are; safety, career opportunities, how to get and keep a job, and the job attitudes that often are the key to employee success and job retention.

4. A premise of the articulated, performance-based instruction guide is that it is absolutely essential that career/ vocational education/training be based on the knowledges, skills, abilities, and personal characteristics that are important to success on the job, if the vocational program is going to validly serve the needs of students and potential employers of the community.

5. Another premise in the articulated instruction guide is that vocational education can no longer be developed according to program titles, be time-based, lack flexibility, or overlook basic fundamentals if the program is to meet the needs of a constantly changing workforce, meet the needs of students and employers, and be of the highest quality.

6. Substantial research clearly indicates that instructional technology and accountability demands are increasing the movement toward the use of instructional systems.

   The systems approach, a method of organizing the instructional situation, methods, media, materials, and equipment so that the maximum knowledge and skill development may be achieved, is promoted because it directs its attention toward teaching the observable behaviors that the vocational student should possess at the termination of instruction.

   The instructional program described in this articulated, performance-based instructional objectives guide has been assembled by participating instructor task force committee representatives representing The School District of Greenville

County and Greenville Technical College and it is based on the concept that the minimum tasks described should be those identified for successful entry level employment according to local task analysis information, state-of-the-art literature, similar/related research/publications, and the expertise of the instructor participants.

7. The articulated instruction guide illustrates one way the (secondary) curriculum may be organized. The example is not intended to imply that there are not other ways to structure the curriculum.

   The articulated instruction guide should be preceived as a vehicle to facilitate the development of alternate, detailed instructional plans for the individual learner.

8. While the objectives in this guide typically have been arranged in a sequence from less to more difficult in performance or as they might occur on the job, the sequence of tasks is not meant to indicate a required pattern.

9. The "suggested minimum instruction times" are included for planning purposes and may be extended as required for the completion of task objectives. An underlying premise of the articulated instruction guide is that it is more desirable for the student to complete some objectives and gain some employable skills rather than to be introduced to a large number of tasks and not acquire any employable skills.

   The actual amount of time required for each task objective may vary according to the local program objectives and depending upon the individual needs of the learner, the instructor, and the facilities/materials available.

10. While it may become necessary to modify the vocational program from the articulated guide description, a lowering of the minimum standards (competency level) recommended (typically by industry) should be avoided to ensure that the program graduate can demonstrate a minimum performance essential to employment success.

11. This articulation guide was drafted in a period of less than twelve months so that a product production deadline of twelve months might be met.

    If the vocational program was too complex to describe in one-year because of the number of major tasks, emphasis was placed on successfully describing the first year of the two-year, secondary level, vocational program so that there would be a foundation for further development. Completion of the second year program tasks were described as the remaining time allowed.

    Because of a restricted development time frame, emphasis was placed on developing a sound and valid articulation guide which might be refined at a later date.

Greenville, SC W.E.H.

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MASONRY

LEVEL: Secondary

TITLE: Masonry

DESIGNATION: MASONRY I   COMPUTER NUMBER: 745

DESCRIPTION: The introductory year of masonry training includes basic mathematics, measuring, and blueprint reading for construction work; occupational safety; the use and care of masonry tools and equipment; the fundamentals of laying out a masonry job including the reading of blueprints, specifications, and codes; estimating; mixing and applying mortars and laying masonry units; and developing speed and skill by building walls, partitions, and other structures with brick and block units.

OBJECTIVE: Upon completing the first year of training, the masonry student should be able to lay a course of brick or block that have horizontal and vertical alignment, to build foundations, piers, and walls. The student should be able to perform the basic mathematical functions to estimate and layout a simple masonry job as well as to read blueprints, specifications, and applicable building codes.

Upon completing the first year of masonry training, the student should have mastered the ability to use and care for masonry hand tools and should be familiar with the operation of masonry equipment such as the masonry saw. The masonry student should be able to mix and apply mortars to acceptable standards as well as to identify the types, properties, and uses of masonry materials and mortars. Upon completing the first year of masonry, the student should have developed both skill and speed in laying brick and block.

A masonry student who exits the program after only the first year of secondary training and enters the masonry trade should expect to invest up to three years as an apprentice.

PERFORMANCE EVALUATION: The evaluation of competency at the termination of the first year of masonry education will be by written outcome-referenced transfer and performance testing as well as by performance and product measurement during simulated/actual job tasks. Emphasis in evaluation will be on measuring competency in the fundamentals of the masonry trade essential to success in the secondary year of vocational education.

PREREQUISITES: None

Suggested Grade Level: 11

SUGGESTED PREPARATION: Helpful courses for the masonry student include: General Math, Basic Geometry, Mechanical Drawing, Prevocation, and Industrial Arts.

The masonry student should be able to work with basic mathematics including fractions, to read rulers and make fractional measurements, to figure proportion, and to estimate the amount and cost of materials needed for a job.

For optimum success, the masonry student should understand tool and material terminology, such as trowel and transom, and should be able to read simple instructions.

REQUIRED INSTRUCTION HOURS:

System	Year
Division	Class/Lab
Credits	3
Hours	540

LEVEL: Secondary

TITLE: Masonry

DESIGNATION: MASONRY II COMPUTER NUMBER: 746

DESCRIPTION: Advanced masonry students will continue developing their skills and knowledges in the use of masonry tools and equipment; mixing and applying mortars; constructing and using scaffolds; as well as developing speed and accuracy in laying masonry units. New skills developed will include laying decorative patterns, building fireplaces, expansion joints, and advanced bricklaying practices.

OBJECTIVE: Upon completing the secondary year of high school masonry training, the graduate will be able to estimate and layout a masonry job, mix and apply mortar to commercial standards, lay a variety of masonry units that are aligned accurately horizontally and vertically, to fit masonry units by cutting, to finish mortar joints to commercial standards, to repair or construct residential, commercial, or industrial structurers, and to install wall ties, anchors, and flashings and dampproof masonry units.

In addition, the masonry graduate will be able to lay decorative patterns, build fireplaces and construct or repair furnaces, partitions, arches, and other structures which require advanced skills.

PERFORMANCE EVALUATION:

The masonry graduate should be prepared to demonstrate the following competencies either by written outcome-referenced transfer or performance tests or by actual task performance.

The graduate will be able to lay brick, block or similar structural materials to construct or repair structurers such as wells, partitions, sewers, arches, and other structures. The mason apprentice will be able to measure distance from reference points and mark guidelines on working surfaces to layout work. The apprentice will be able to accurately use the trowel in spreading a soft bed of mortar and binder for blocks, and to level, align and embed in mortar allowing for a specified joint thickness.

The apprentice will be skilled in the use and care of hand tools such as the trowels, brick and stone hammers, and chisels. In addition, the graduate will be able to use power tools used in masonry work. The apprentice will be able to break bricks to fit spaces too small for a whole brick using the trowel or brick hammer. In addition, the apprentice mason will be able to determine vertical and horizontal alignment of courses, using the plumb bob, gageline, and level; and to fasten brick to the face of structures.

PREREQUISITES: Masonry I

Suggested Grade Level: 12

RECOMMENDED: Skills necessary to read and understand masonry terminology and follow simple written and verbal instructions in the proper sequence.

Skills necessary to read rulers to the fraction, to perform simple math functions including fractions and proportions, and to estimate the cost of materials needed for a simple masonry job.

REQUIRED INSTRUCTION HOURS:

System	Year
Division	Class/Lab
Credits	3
Hours	540

TOTAL REQUIRED HOURS FOR THE TWO YEAR SECONDARY MASONRY PROGRAM:

System	2-Years
Division	Class/Lab
Credits	6
Hours	1,080

WORKING CONDITIONS:

The masonry student should like using tools to make things, working outdoors, doing heavy physical labor, doing routine and organized work, traveling from job site to job site, and working with other construction people.

The student should be able to work rapidly, think ahead and plan work while following set procedures and standards, work cooperatively with others, work outdoors in a variety of weather conditions, work safely in high places or in cramped foundation excavations, visualize objects from drawings or diagrams, calculate portions, and see and compare differences in size, shape, and form.

Typically, brick masons work outside. They are required to stand, kneel, or stoop for long periods of time and may have to lift heavy materials, such as 40-60 pound bags of mix or cement blocks to complete a job.

The mason is subject to minor injuries from tools and materials and there is the potential of falls from scaffolds. Masons, however, are less likely to experience injury on the job than other construction workers despite the physical demands and general hazards of construction.

Physically, the mason must be in good health, have good coordination in the upper body, be able to climb and maintain body balance, have good gripping strength, and be able to lift and carry loads of up to 100 pounds.

About 1 in 4 bricklayers is self-employed and earns a living from contracting small jobs such as patios, walks, fireplaces, and small structures of subcontracting jobs.

JOB QUALIFICATIONS:

Masonry is designed to prepare a masonry apprentice with the necessary knowledges, theoretical structure, tool usage, and related supportative and occupational survival skills to ensure job success.

Skills and knowledges introduced primarily are designed for the career fields of:

- Bricklayer Helper, D.O.T. Code 861.687-010
- Bricklayer, Construction, D.O.T. Code 861.381-018

Related fields might include:

- Cement Mason Helper, D.O.T. Code 869.687-026
- Cement Mason, D.O.T. Code 844.369-010
- Stone Mason, D.O.T. Code 861.381-038
- Terazzo Worker, D.O.T. Code 861.381-046

With limited skills or training, one might be employed initially as a helper or hod carrier and acquire skills by observing and learning from experienced workers. A helper's work might include carrying materials, moving scaffolds, and mixing mortar.

Typically, graduates of the secondary masonry program will enter the trade as an apprentice prior to beginning work as a mason. A vocationally trained and skilled apprentice brick mason should be laying brick within 2-3 months after employment.

Career opportunities may broadened with additional training at the post-secondary level, especially opportunities including supervisory or estimator positions. The masonry student should give serious consideration to preparing for independent contractor work by investing in additional training at the post-secondary level since there typically is a 25 percent trend toward self-employment in the masonry field.

EMPLOYMENT OUTLOOK: Growth in the masonry field probably will be moderate, with peak demands in the spring and summer months when construction activity is at a peak. Jobs typically will fluctuate and masons may have to wait for jobs which follow the activity/growth patterns of the construction industry.

EMPLOYMENT PROJECTION: According to projections by the South Carolina Employment Security Commission, growth in the brickmasonry field in the Greenville-Spartanburg area will be about 7 percent between 1978 to 1985 with an estimated growth of around 10 additional brickmasonry positions being added between 1983 and 1985. This growth projection, however, does not necessarily reflect the need for replacement to retirements, tradesmen leaving the field, etc.

South Carolina Occupational Projections, 1978-1985, Columbia, SC: South Carolina Employment Security Commission (Research & Analysis Department), p. 157, 1982.

SECONDARY LEVEL
STATE DEPARTMENT OF EDUCATION
RECOMMENDED PROGRAM

BRICK MASONRY
(Bricklaying, Masonry)*

The South Carolina State Department of Education suggests that the high school Brick Masonry program should consist of those knowledges and skills necessary to prepare the graduate to successfully enter the building construction trade as a brick /sic/ mason. Recommended subject areas include basic applied mathematics, blueprint reading, and masonry technology. Masonry prepares the graduate to enter the trade as an apprentice, and accurately lay bricks and a variety of blocks such as concrete, glass, and terra-cotta. The masonry apprentice should be prepared to construct or repair walls, partitions, arches, sewers, furnaces, and masonry structures. In addition, the apprentice mason should be familiar with laying out a masonry job with specific reference to rigid insulation, reflactories, and masonry units specified for residential, commercial, and industrial construction.

Suggested topics include but need not be limited to the following:

1. Safety
2. Brick masonry in building construction
3. History of brick and bricklaying
4. Tools and equipment
5. Blueprint reading
6. Brick, mortar, and metal ties
7. Fundamentals of good masonry construction
8. Bonds, patterns, and textures
9. Reinforced brick masonry
10. Walls
11. Chimneys and fireplaces
12. Arches
13. Floors and pavements
14. Concrete work
15. Estimating

*Brick Masonry as described by the S.C. State Department of Education indicates that the course is not limited to bricklaying and would be better described simply as Masonry.

Outline of High School Credit Courses, Columbia, SC: S.C. State Department of Education, pp. 126-127, 1980 (Locally revised).

Defined Minimum Program for South Carolina School Districts, Columbia, SC: S.C. State Department of Education, 1980.

POST-SECONDARY LEVEL DESCRIPTION
GREENVILLE TECHNICAL COLLEGE

MASONRY

At the post-secondary level, Masonry is a one-year diploma program including the study of blueprint reading, construction layout, materials, codes and specifications, as well as designs and processes as they relate to the art of laying brick and other masonry components. In addition post-secondary training includes a study of the terminology of tools and equipment as well as their use in practical training, and modern construction techniques and masonry materials. Emphasis is placed upon developing the masonry skills necessary for employment success. Student work is evaluated for accuracy, neatness, and speed.

The suggested sequence of required courses is:

FIRST QUARTER

COURSE NUMBER	COURSE TITLE	CLASS	LAB	CREDIT
MAT 112	Applied Mathematics I	5	0	5
MSY 111	Brick Masonry I	2	18	8
MSY 112	Construction Blueprint Reading	5	0	5
		12	18	18
SECOND QUARTER				
MSY 121	Brick Masonry II	2	18	8
MSY 117	Construction Layout	2	3	4
PSY 112	Industrial Human Relations	3	0	3
		7	21	15
THIRD QUARTER				
MSY 131	Brick Masonry III	2	18	8
MSY 132	Estimating & Quantity Take-Off	3	0	3
MSY 149	Foremanship	2	0	2
ECO 100	Consumer Economics	3	0	3
		10	18	16
FOURTH QUARTER				
MSY 141	Brick Masonry IV	2	18	8
MSY 133	Building Codes & Ordinances	3	0	3
MSY 298	Field Studies	2	0	2
ENG 126	Communications I	3	0	3
		10	18	16

Source: Catalog, Industrial Division, Greenville Technical College, 1982-1984, Greenville, SC: Greenville Technical College, Masonry Department, GTC, pp. 18-19.

FIRST QUARTER

MAT 112 APPLIED MATHEMATICS I:

Review of basic operations of arithmetic and an introduction to elementary algebra through linear equations in one unknown. Industrial applications. Prerequisite: Satisfactory score on math placement test. (5-0-5)

MSY 111 BRICK MASONRY I:

Students will learn to name and use tools of the trade, and learn to mix and spread mortar. (2-18-8)

MSY 112 CONSTRUCTION BLUEPRINT READING:

Course will cover architectural working drawings and shop drawings, including foundations, footings, piers, walls, and structural elements. All standard symbols, details, sections, etc., will be used. (5-0-5)

SECOND QUARTER

MSY 121 BRICK MASONRY II:

Training is given in constructing walls with various brick bonds, details of veneering, and the laying of cement block. The brick and block cutting saw will be introduced, along with the safety procedures of operation in the construction of masonry walls and corners. (2-18-8)

MSY 117 CONSTRUCTION LAYOUT:

A course designed to teach persons in the masonry trade how to locate and layout building corners and elevation. The use of transits, levels, tapes, rules, etc., will be taught. (2-3-4)

PSY 112 INDUSTRIAL HUMAN RELATIONS:

Provides supervised experience and instruction designed to help the student recognize and develop the traits necessary for good relations with fellow workers, supervisors, subordinates, customers and others. Through exercises involving awareness, self-concept and self-evaluation, role-playing, and group and individual problem solving, the course helps to develop improved interpersonal relationships. (3-0-3)

THIRD QUARTER

MSY 131 BRICK MASONRY III:

This course will cover fireplace construction and arches and lintels. Practice and instruction are given to enable students to design and be proficient in these areas. (2-18-8)

MSY 132 ESTIMATING & QUANTITY TAKE-OFF:

Practical work in quantity survey for brick layers and masons is provided. It includes the listing of all materials used provided. It includes the listing of all materials used in a structure in terms of various sizes, amounts, and styles. The student will be able to estimate the quantities of each material needed to do a job. (3-0-3)

MSY 149 FOREMANSHIP:

A study of the field of supervision from a practical standpoint. Students will learn the responsibility of supervision, job methods, and the application of human relations to the job. (2-0-2)

ECO 100 CONSUMER ECONOMICS:

Emphasizes the role of the consumer in our society. It includes consumer decision making, money and marital happiness, money management, consumer credit, intelligent shopping, financing a home, transportation, health services, estate planning, and consumer protection. (3-0-3)

FOURTH QUARTER

MSY 141 BRICK MASONRY IV:

A practical application of skills and knowledge gained in MSY 111, 121, and 131. The student will have a complete knowledge of professional and safety practices in the masonry profession. (2-18-8)

MSY 133 BUILDING CODES & ORDINANCES:

This course will cover city, county, and state building codes and how they pertain to masonry construction. The masonry mechanic should be able to obtain the necessary data such as measurements pertaining to lengths, heights, window and door positions, steps, interior partitions, starting special designs, and incorporating the necessary information from the blueprints to determine that the work conforms. (3-0-3)

MSY 298 FIELD STUDIES:

Students are taken to building sites where new construction or modification of existing structures are underway. Students will observe methods used by masonry personnel on the job in both residential and heavy construction situations. The instructor will point out certain construction procedures that are of importance to the students. (2-0-2)

ENG 126 COMMUNICATIONS I:

An intensive review of English grammar and an introduction to expository writing to develop the competence needed to communicate effectively on and off the job. (3-0-3)

SECONDARY AND POST-SECONDARY MASONRY TRAINING SIMILARITIES

There is mutual agreement among secondary and post-secondary instructor participants of the Task Force Committee on Masonry that there is considerable similarity between the two-year secondary level program and the one-year post-secondary level program.

The purposes of the secondary and post-secondary masonry programs are essentially the same: They provide graduates with entry level skills to successfully perform at the masonry apprentice level. There, however, may be a difference between secondary and post-secondary graduate competency because of student age, motivation, related training, or prior job experience. Post-secondary students typically are older, have had some job experiences, and are motivated differently from secondary students who may be enrolled in masonry to learn about the field (exploratory) or to obtain vocational credits for graduation.

Instructor participants are in mutual agreement that the same masonry skills may be acquired from the secondary or post-secondary level programs.

The post-secondary masonry program includes related areas of training which are not a part of secondary masonry training such as; Applied Mathematics I, Construction Layout, Industrial Human Relations, Estimating and Quantity Take-off, Foremanship, Consumer Economics, Building Codes and Ordinances, and Communications.

In general, post-secondary programs have larger instructional budgets than secondary programs and, therefore, may offer more learning experiences due, for example, to the availability of more instructional materials or more field experiences (work).

While there appears to be considerable similarity or overlap between secondary and post-secondary masonry programs, it should not be assumed that the programs are identical or totally overlap. There will be a number of tasks in which the masonry student might become competent by continuing training at the post-secondary level if post-secondary training builds on demonstrated competencies and is individualized to the student's needs.

FIRST YEAR

SECONDARY LEVEL MASONRY TASK OBJECTIVES

The instructional program described in the following units of this articulated secondary level masonry curriculum guide represents a mutual agreement by secondary instructors concerning the minimum task skills and knowledges that should be developed during the initial year of training.

It is important to acknowledge that there probably will be some overlap between first and second year instructional tasks based on such factors as the motivation and ability of the students as well as the training opportunities such as field work that may be present at a particular time, etc.

UNIT 1.0

Unit 1,0, Introduction/Orientation, has been designed to represent introductory requirements of the vocational program such as course policies, procedures, and safety regulations, leadership training, desirable work attitudes and habits that potential employers recommend be incorporated in secondary instruction, career information, and basic math and related skills necessary for success in the vocation.

Some task objectives that are described in this first unit naturally will be learned early in the instructional program while competencies in other tasks may result during the first year or second year. For example, students must understand the policies of the program very early in the first year but may not develop competencies in job attitudes or career information until the second year. Job habits and attitudes typically will be taught during the entire two year training program.

UNIT 1.0 A	INTRODUCTION/ORIENTATION
UNIT 1.0 B	INTRODUCTION TO SAFETY
UNIT 1.0 C	INTRODUCTION TO LEADERSHIP/ JOB COMMUNICATIONS
UNIT 1.0 D	PREPARING FOR WORK
UNIT 1.0 E	INTRODUCTION TO DESIRABLE JOB/LEARNING CHARACTERISTICS/HABITS/ATTITUDES
UNIT 1.0 F	BASIC MATH SKILLS
UNIT 1.0 G	BASIC MEASURING

MASONRY
INTRODUCTION
SUGGESTED INSTRUCTION TIMES

MASONRY UNIT/TASK		SUGGESTED HOURS
Unit 1.0 A	INTRODUCTION/ORIENTATION	
1.01	Review/Follow Career Center Policies and Procedures	3
1.02	Orientation to Vocational Program Classroom/Shop/Lab	6
1.03	Review Course Objectives and Standards	6
Unit 1.0 B	INTRODUCTION TO SAFETY	
1.01	General Orientation	3
1.02	Identify Desirable Vocational Training Safety Habits	3
1.03	Observe Classroom Safety Practices	5
1.04	Apply Fire Safety Rules and Procedures	2
1.05	Apply Electrical Safety Rules and Procedures	2
1.06	Personal Safety	6
Unit 1.0 C	INTRODUCTION TO LEADERSHIP/ JOB COMMUNICATIONS	
1.01	Work Cooperatively with Fellow Students	N/A
1.02	Demonstrate Desirable Characteristics of Leadership	N/A
1.03	Participate in VICA Club Activities	N/A
1.03	Demonstrate Proper Use of Parliamentary Procedure	N/A
1.03	Communicate a Message by the Medium of a Speech	N/A

Unit 1.0 D PREPARING FOR WORK

1.01	Describe the Free Enterprise System and the Difference Between Labor and Management	N/A
1.02	Interpret Labor Laws and Regulations	1
1.03	Interpret Payroll Deductions for Taxes, etc.	1
1.04	Identify Typical Career Opportunities	3
1.05	Locate Job Opportunities	3
1.06	Prepare Resume	3
1.07	Compose Application Letter	3
1.08	Complete a Typical Employment Application Form	6
1.09	Interview for a Job	6
1.10	Compose Follow-up Letter	*
1.11	Identify Post-secondary Career Development Opportunities	3

Unit 1.0 E INTRODUCTION TO DESIRABLE JOB/LEARNING CHARACTERISTICS/HABITS/ATTITUDES

1.01	Describe Good Work Habits Important to Job Success	N/A
1.02	Exhibit Successful Job Performance Characteristics	3
1.03	Exhibit Desirable Work Attitudes	3
1.04	Demonstrate Respect for and Care of School Property	N/A

Unit 1.0 F BASIC MATH SKILLS

1.01	Basic Math - Fractions	18
1.02	Basic Math - Decimals	6
1.03	Basic Math - Volumes	3
1.04	Basic Math - Areas	3

Unit 1.0 G BASIC MEASURING

1.01	Measuring	6
*Optional	TOTAL HOURS	110

TASK LISTINGS
MASONRY

UNIT/TASK	DESCRIPTION
Unit 1.0 A	INTRODUCTION/ORIENTATION
1.01	(Review/Follow Career Center Policies and Procedures) Given information on career center policies and procedures, apply these policies and procedures on a day-to-day basis.
1.02	(Orientation to Vocational Program Classroom/Shop/Lab) Given information on classroom/shop or instructor's policies and procedures, apply these policies and procedures on a daily basis, meeting the standards of the instructor 100 percent.
1.03	(Review Course Objectives and Standards) Given an introduction to the vocational program, a review of the course objectives and minimum standards of performance; describe the course objectives, and the minimum performance expected to demonstrate competency in given objectives.
Unit 1.0 B	INTRODUCTION TO SAFETY
1.01	(General Orientation) Given an orientation to building, shop, and fire safety; discuss, identify, or demonstrate general shop safety behavior and fire procedures.
1.02	(Identify Desirable Vocational Training Safety Habits) Given an introduction/orientation to general safety as well as to safety in the vocational education program or on the job; identify general occupational safety habits to the satisfaction of the instructor and meet all applicable safety rules and regulations.
1.03	(Observe Classroom Safety Practices) Given a typical vocational classroom/shop/lab or job situation, exhibit an awareness of safety practices, safe work habits, and a positive attitude concerning job safety and accident prevention and meet standards established by the instructor.
1.04	(Apply Fire Safety Rules and Procedures) Given examples of types of fires, fire extinguishers, and possible shop situations, apply fire safety rules and procedures. Meet National and local fire safety procedures.
1.05	(Apply Electrical Safety Rules and Procedures) Given orientation to identifying electrical hazards, apply electrical safety rules and procedures. Electrical

equipment with exposed wire, frayed cables, and deteriorated insulation must be reported and corrected. Proper grounding must be employed and maintained. Junction boxes, outlets, switches, breakers switches, and panels should be identified as to their use. Meet all applicable National and local standards and the standards of the instructor.

1.06 (Personal Safety) Given instruction, identify personal safety clothing, equipment, or procedures to ensure safety in the vocational field/training, with 100 percent accuracy, demonstrate proper use of safety behavior.

Unit 1.0 C INTRODUCTION TO LEADERSHIP/JOB COMMUNICATIONS

1.01 (Work Cooperatively With Fellow Students) Given instruction and an opportunity to meet fellow students in the vocational program environment, work cooperatively with fellow students as well as with other students in related vocational learning activities. Meet the instructor's standards and cooperate to the satisfaction of fellow students as a group.

1.02 (Demonstrate Desirable Characteristics of Leadership) Given an introduction/orientation to desirable qualities of a good leader, describe characteristics typical of a good leader, discuss desirable leadership qualities, and demonstrate an ability to follow as well as take a leadership position. Performance should be satisfactory to the instructor and fellow students.

1.03 (Participate in VICA Club Activities) Given an introduction/orientation to the Vocational Industrial Club of American (VICA), describe the general purposes of VICA, describe a typical VICA program at a vocational center, recall from memory the VICA motto, state the VICA pledge from memory, identify the symbols/symbolism in the VICA emblem, identify what the colors of the VICA organization represent. Performance should be acceptable to the VICA Club sponsor, instructor, and VICA club members.

1.03 (Demonstrate Proper Use of Parliamentary Procedure) Given instruction, apply the principles of parliamentary procedure and describe the characteristics of a good chairman.

1.03 (Communicate a Message by the Medium of a Speech) Given instruction, list purposes of a speech, characteristics of a speech, and write and orally deliver a speech. The delivered speech should contain accurate information, be technically correct in organization and delivery, and the intended message should be communicated.

Unit 1.0 D PREPARING FOR WORK

1.01 (Describe the Free Enterprise System and the Difference Between Labor and Management) Given an introduction/orientation to the free enterprise system of economics, describe to the satisfaction of the instructor the free enterprise system of economics as found in the United States and describe the relationship between labor and management.

1.02 (Interpret Labor Laws and Regulations) Given instruction, necessary references concerning labor laws and regulations, interpret typical labor laws and regulations. Performance must meet the instructor's standards.

1.03 (Interpret Payroll Deductions for Taxes, etc.) Given instruction and sample forms concerning income tax and other withholdings, interpret the typical forms used in income tax and other withholdings to the satisfaction of the instructor and itemize typical payroll deductions that worker encounters. Performance must be to the instructor's standards.

1.04 (Identify Typical Career Opportunities) Given instruction, data on the local business and industry, opportunities to study entry-level job opportunities; identify the major catagories of potential employers in the local community (and the key characteristics of each).

1.05 (Locate Job Opportunities) Given job placement information such as newspaper ads and personal contacts, list a minimum of ten specific jobs in the community. One week will be allowed to complete the task.

1.06 (Prepare Resume) Given examples of suitable resume/personal data sheets, prepare and type (or print at a minimum) a personal resume on paper acceptable to the instructor with all errors acceptable corrected.

1.07 (Compose Application Letter) Given a newspaper ad for a job, compose a letter of application. The letter must be mailable and must include all necessary personal information.

1.08 (Complete a Typical Employment Application Form) Given an employment application form typical of the job, complete the form with all information accurate, neatly typed or printed in, and aligned in the form blanks.

1.09 (Interview for a Job) Given instruction on how to interview for a job, a job interview checklist, and a mock job interview; complete a job interview to the satisfaction of the instructor.

1.10 (Compose Follow-up Letter) Given a case situation by the instructor or from the textbook, compose and write a follow-up letter appropriate to the job application or interview situation and in mailable form. The finished letter must meet the instructor's standards.

1.11 (Identify Post-secondary Career Development Opportunities) Given an orientation to similar post-secondary career development programs, such as offered at Greenville Technical College, a report of skill competencies developed during secondary training, and other information as needed; identify post-secondary career development opportunities.

Unit 1.0 E INTRODUCTION TO DESIRABLE JOB/LEARNING CHARACTERISTICS/HABITS/ATTITUDES

1.01 (Describe Good Work Habits Important to Job Success) Given introduction/orientation to desirable work habits, as described by potential employers or tradesmen, demonstrate desirable (good) work habits (based on information provided by the instructor) represent typical standards expected by business/industry (potential employers) for entry employment success.

1.02 (Exhibit Successful Job Performance Characteristics) Given instruction, demonstrate job performance characteristics that are considered important to entry-level career success in the vocational field. A "Job Performance Rating Sheet" will be used to evaluate performance and all items must be rated "frequently" or above.

1.03 (Exhibit Desirable Work Attitudes) Given instruction, demonstrate work attitudes that the majority of potential employers prefer in an entry level worker. Performance will be evaluated on a "Work Attitudes Score Card" and a minimum of 90 percent should be attained. Performance will be rated throughout training and should improve to 100 percent by the end of the training period.

1.04 (Demonstrate Respect for and Care of School Property) Given a classroom, shop, or other instructional setting with access to furniture, equipment, tools and materials, and given proper instruction; demonstrate a respect for and care of public property (training facilities) and instructional materials to the standards established by The School District of Greenville County the career center, and the instructor.

Unit 1.0 F BASIC MATH SKILLS

1.01 (Basic Math - Fractions) Given a pretest or examples by the instructor, conduct the following operations with fractions:

1. Change any fraction to a decimal number, and any terminating decimal number to a fraction.
2. Arrange in order...unit and simple nonunit fractions.
3. Write equivalent fractions in higher, lower, and lowest terms.
4. Write improper fractions as whole or mixed numbers, and mixed numbers as improper fractions.
5. Multiply fractions and mixed numbers, expressing answers in simplest form.
6. Divide fractions and mixed numbers, expressing answers in simplest form.
7. Add and subtract unlike fractions, expressing answers in simplest form.
8. Add and subtract mixed numbers with unlike fractions, expressing answers in simplest form.
9. Use rational numbers to solve simple work problems.

1.02 (Basic Math - Decimals) Given a pretest or examples by the instructor, conduct the following decimal math operations:

1. Name the place value of digits in decimal numbers of up to nine digits before the decimal and six digits after the decimal.
2. Compare decimal numbers and arrange them in proper order.
3. Write the numeral for any decimal number of up to four decimal places.
4. Round decimal numbers to any designated place value up to thousandths.
5. Add and subtract decimal numbers of up to six digits.
6. Multiply decimal numbers by whole numbers or decimal numbers.
7. Divide a number by a three-digit decimal number.
8. Multiply and divide decimal numbers by powers of ten, by inspection.

1.03 (Basic Math - Volumes) Given a pretest or examples by the instructor, find the volume of any rectangular prism or cube.

1.04 (Basic Math - Areas) Given a pretest or examples by the instructor, find the area of the following types of figures:

a. Rectangle and square
b. Circle

Unit 1.0 G BASIC MEASURING

1.01 (Measuring) Given proper instructions, read a rule and use other measuring tools with the precision necessary to take measurements or set them up.

UNIT 1.0 A

INTRODUCTION/ORIENTATION

UNIT 1.0 A INTRODUCTION/ORIENTATION

TASK 1.01 REVIEW/FOLLOW CAREER CENTER POLICIES AND PROCEDURES

PERFORMANCE OBJECTIVE:

Given information on career center policies and procedures, apply these policies and procedures on a day-to-day basis.

PERFORMANCE ACTIONS:

1.0101 Review center policies and procedures.

1.0102 Review relevant philosophy of center and, The School District of Greenville County, and the South Carolina State Department of Education.

1.0103 Review relevant safety policies and procedures under unit concerning safety, and practice desired safety behavior as outlined in relevant safety policies and procedures.

PERFORMANCE STANDARDS:

- Using information and materials supplied, review and apply career center policies and procedures daily.

SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Center Student Handbook.
- High School Student Handbook.
- Written Policies and Procedures of The School District of Greenville County.
- Policies and Procedures of the South Carolina State Department of Education.
- "Authorization" and "release" forms (such as safety releases).

UNIT 1.0 A INTRODUCTION/ORIENTATION

TASK 1.02 ORIENTATION TO VOCATIONAL PROGRAM CLASSROOM/SHOP/LAB

PERFORMANCE OBJECTIVE:

Given information on classroom/shop or instructor's policies and procedures, apply these policies and procedures on a daily basis, meeting the standards of the instructor 100 percent.

PERFORMANCE ACTIONS:

1.0201 Review with instructor the shop policies and procedures.

1.0202 Apply, with 100 percent accuracy, the policies and procedures of the vocational program, shop, or instructor.

PERFORMANCE STANDARDS:

- Apply information/instruction given during orientation and throughout training period to comply with all policies and procedures of the shop (instructor) on a day-to-day basis.
- Standards of the State, School District, Career Center, and high school, and instructor apply.

SUGGESTED INSTRUCTION TIME: 6 Hours

RECOMMENDED:

- Vocational education (shop) policies and procedures should be written and posted or distributed to students.

TASK 1.03 REVIEW COURSE OBJECTIVES AND STANDARDS

PERFORMANCE OBJECTIVE:

Given an introduction to the vocational program, a review of the course objectives and minimum standards of performance; describe the course objectives, and the minimum performance expected to demonstrate competency in given objectives.

(NOTE: This task may be accomplished in general at the beginning of the first year and in detail over the two year training period.)

PERFORMANCE ACTIONS:

1.0301 Review each major objective of the vocational program as outlined in this articulated, performance-based instruction objectives guide.

1.0302 Review the minimum performance standards of the objectives.

Possible Alternate Actions:

Instructor may require students to identify objectives and standards at the initiation of each new unit of instruction.

PERFORMANCE STANDARDS:

- Using information provided, explain the objectives of the course and describe the minimum performance for each objective.

SUGGESTED INSTRUCTION TIME: 6 Hours

RECOMMENDATION:

- Course objectives, such as the Task Listing objectives, should be written and posted or distributed to students.

UNIT 1.0 B

INTRODUCTION TO SAFETY

TASK 1.01 GENERAL ORIENTATION

PERFORMANCE OBJECTIVE:

Given an orientation to building, shop, and fire safety; discuss, identify, or demonstrate general shop safety behavior and fire procedures.

PERFORMANCE ACTIONS:

1.0101 As applicable, discuss basic safety rules applicable to the training facility.

1.0102 Identify general shop safety rules.

1.0103
- a. Review fire safety rules with the instructor.
- b. Identify fire safety equipment, exits, and procedures in the shop and building area during a fire.

PERFORMANCE STANDARDS:

- Follow basic safety rules and established shop safety practices.
- Follows established fire safety practices and procedures.

SUGGESTED INSTRUCTION TIME: 3 Hours

UNIT 1.0 B — INTRODUCTION TO SAFETY

TASK 1.02 — IDENTIFY DESIRABLE VOCATIONAL TRAINING SAFETY HABITS

PERFORMANCE OBJECTIVE:

Given an introduction/orientation to general safety as well as to safety in the vocational education program or on the job; identify general occupational safety habits to the satisfaction of the instructor and meet all applicable safety rules and regulations.

PERFORMANCE ACTIONS:

1.0201 Listen to all information provided by the instructor or others concerning safety in the career center, vocational program and in live learning activities.

1.0202 Observe safety posters.

1.0203 Observe safety warning devices for hazardous materials or work areas.

1.0204 Demonstrate correct safety practices going to and from the classroom/shop as well as in the classroom situation.

1.0205 Describe the effect of accidents on the production dollar, due to possible time loss.

1.0206 Observe learning situations or other situations for the observation of safe situations as well as violation of proper safety rules and regulations.

PERFORMANCE STANDARDS:

- To the standards of the instructor and standards applicable to the classroom or school or in the vocational field, demonstrate desirable occupational safety habits.
- "Zero" accidents.
- "Zero" safety violations.

SUGGESTED INSTRUCTION TIME: 3 Hours

UNIT 1.0 B INTRODUCTION TO SAFETY

TASK 1.03 OBSERVE CLASSROOM SAFETY PRACTICES

PERFORMANCE OBJECTIVE:

Given a typical vocational classroom/shop/lab or job situation, exhibit an awareness of safety practices, safe work habits, and a positive attitude concerning job safety and accident prevention and meet standards established by the instructor.

PERFORMANCE ACTIONS:

1.0301 Develop an awareness of vocational training/job hazards and become more safety conscious.

1.0302 Develop a serious attitude toward the daily use of safety procedures.

1.0303 Prepare for safety before entering the training work area.

1.0304 Prepare for safety at the work station.

1.0305 Prepare for safety on existing the training work area.

1.0306 Demonstrate knowledge of general safety color coding in the training/job facility and on equipment and tools.

1.0307 Practice safe procedures/habits daily.

PERFORMANCE STANDARDS:

- "Zero-level" accident record in vocational program.
- Instructor's standards based on recommended resources.
- Applicable OSHA Standards.

SUGGESTED INSTRUCTION TIME: 5 Hours

POSSIBLE RESOURCES:

Current vocational program safety guide publication of The School District of Greenville County.

Jacobs, Clinton O., and Howard J. Turner, Developing Shop Safety Skills, Athens, GA: American Association for Vocational Instructional Materials. (Approximately 80 pages of brief, visually clear suggestions concerning a variety of shop safety situations. Good student or resource manual.)

TASK 1.03 OBSERVE CLASSROOM SAFETY PRACTICES (Con't.)

RECOMMENDED RESOURCES:

Safety Handbook, A Guide for Trade and Industrial Programs, Clemson University, SC: Vocational Education Media Center, 1968. (No. 13/2/70, $2.25: Accompanying 31 Transparencies, No 9/8/68, $5.75.) Available from Trades and Industries Division Supervisor, Office of Vocational Education, South Carolina State Department of Education or from the Vocational Education Media Center, Clemson University, SC.

Planning for Emergencies, Occupational Safety and Health Short Course Number Seven, Columbia, SC: SC State Board for Technical and Comprehensive Education.

Notgrass, Troy, Safety Handbook for ICT, The University of Texas at Austin: Center for Occupational Curriculum Development, Division of Continuing Education, 1978.

Hoerner, Thomas A., and Mervin D. Bettis, Power Tool Safety and Operation, St. Paul, MI: Hobar Publications, 1977.

RELATED TECHNICAL INFORMATION:

- Regulations of individual center or vocational program.
- Regulations of The School District of Greenville County.
- Codes, laws, and ordinances.
- Materials and equipment handbooks and manuals.
- OSHA Regulations.
- E.P.A. Regulations.

UNIT 1.0 B INTRODUCTION TO SAFETY

TASK 1.04 APPLY FIRE SAFETY RULES AND PROCEDURES

PERFORMANCE OBJECTIVE:

Given examples of types of fires, fire extinguishers, and possible shop situations, apply fire safety rules and procedures. Meet National and local fire safety procedures.

PERFORMANCE ACTIONS:

1.0401 Identify and explain application for fire extinguishers of the following types:

a. Form
b. Carbon Dioxide
c. Soda Acid
d. Pump Tank
e. Gas Cartridge
f. Dry Chemical
g. Multi-purpose Dry Chemical

1.0402 Describe procedures for operating selected fire extinguishers.

1.0403 Identify potential causes of fire in the vocational field/shop and common methods for avoiding or preventing fires.

1.0404 Inspect shop/laboratory for conformity with fire safety rules and procedures.

1.0405 Identify/explain relevant safety precautions applicable to vocational training activities.

PERFORMANCE STANDARDS:

- Apply applicable fire safety rules and procedures to the vocational program/training meeting all applicable standards, National and local, and meeting instructor's standards.

SUGGESTED INSTRUCTION TIME: 2 Hours

TASK 1.05 APPLY ELECTRICAL SAFETY RULES AND PROCEDURES

PERFORMANCE OBJECTIVE:

Given orientation to identifying electrical hazards, apply electrical safety rules and procedures. Electrical equipment with exposed wire, frayed cables, and deteriorated insulation must be reported and corrected. Proper grounding must be employed and maintained. Junction boxes, outlets, switches, breakers switches, and panels should be identified as to their use. Meet all applicable National and local standards and the standards of the instructor.

PERFORMANCE ACTIONS:

1.0501 Explain importance of labeling circuit breakers.

1.0502 Explain importance of proper grounding of machines or equipment of electrically operated hand tools.

1.0503 Demonstrate/explain methods for using flexible extention cords, long cables, or drop lights.

1.0504 Identify electrical hazards and explain safety rules pertaining the vocational field of training.

1.0505 Identify approved locations for all electrical equipment and power sources in the shop or at the training field location.

1.0506 Interpret safety precautions for electricity in the vocational shop.

PERFORMANCE STANDARDS:

- Apply electrical safety rules and procedures for the vocational shop/laboratory, including field training locations, on a day-to-day basis meeting all applicable National and local safety rules and regulations as well as the standards of the instructor.

SUGGESTED INSTRUCTION TIME: 2 Hours

(NOTE: Specific safety procedures and recommendations pertaining to a tool and equipment item may be included as a part of the task description concerning the tool/equipment.)

TASK 1.06 PERSONAL SAFETY

PERFORMANCE OBJECTIVE:

Given instruction, identify personal safety clothing, equipment, or procedures to ensure safety in the vocational field/training, with 100 percent accuracy, demonstrate proper use or safety behavior.

PERFORMANCE ACTIONS:

1.0601 List and explain personal safety rules/ procedures.

1.0602 Identify appropriate protective clothing/ equipment/etc., used in the vocational field/training, possibly from a given list, sketch, or mock-up.

PERFORMANCE STANDARDS:

- Given a list, sketch, or mock-up, identify with 100 percent accuracy personal safety clothing, equipment, etc., used in the vocational field.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Additional personal safety training will be integrated into occupational task training.

Addendum to Safety Unit

STUDENT'S SAFETY PLEDGE
AND
PARENT'S/GUARDIAN'S PERMISSION FOR OCCUPATIONAL TRAINING

______________________________, as part of vocational education training, will use/operate potentially hazardious occupational tools, machinery, equipment, and materials typical of the vocational field; provided that the student pledges to follow all safety rules and regulations of the instructor/career center/The School District of Greenville County and provided that the student's parent or guardian grants permission for occupational training by signing the release below.

TO THE STUDENT:

The vocational student will be given proper instruction, both in the use of and correct safety procedures concerning occupational tools, machinery, equipment, and materials typical to the vocational field before being allowed to use/operate them.

The student must assume responsibility for following safe practices and rules, and therefore the student is asked to subscribe to the following safety pledge.

STUDENT'S SAFETY PLEDGE

1. "I (student) promise to follow all safety rules of the instructor/of the shop.
2. "I promise never to use a tool, machine, piece of equipment, or material of the vocational program without first having permission from the instructor.
3. "I will not ask permission to use a particular tool, machine, or piece of equipment unless I have been instructed in its use, and have made 100 percent on the safety test for that tool, machine or equipment.
4. "I will report any accident or injury to the vocational instructor immediately.
5. "I will report any potentially hazardious situation to the vocational instructor immediately."

Date __________ Student's Signature __________________________

PARENT'S/GUARDIAN'S PERMISSION

"I hereby give my consent to allow my son/daughter to use/operate all occupational tools, machines, equipment, and materials necessary in carrying out the requirements of the vocational program of training."

Date __________ Parent's/Guardian's Signature ________________

(Parents are cordially invited to visit the shop to inspect the occupational tools, machines, and equipment and to see them in operation.)

UNIT 1.0 C

INTRODUCTION TO LEADERSHIP/ JOB COMMUNICATIONS

UNIT 1.0 C INTRODUCTION TO LEADERSHIP

TASK 1.01 WORK COOPERATIVELY WITH FELLOW STUDENTS

PERFORMANCE OBJECTIVE:

Given instruction and an opportunity to meet fellow students in the vocational program environment, work cooperatively with fellow students as well as with other students in related vocational learning activities. Meet the instructor's standards and cooperate to the satisfaction of fellow students as a group.

PERFORMANCE ACTIONS:

1.0101 Participate in class and group learning activities.

1.0102 Encourage team work.

1.0103 Help plan student activities that promote cooperation.

PERFORMANCE STANDARDS:

- Work cooperatively with fellow students to the standards of the instructor and to the standards expected by fellow students as a group.

SUGGESTED INSTRUCTION TIME: N/A

UNIT 1.0 C INTRODUCTION TO LEADERSHIP

TASK 1.02 DEMONSTRATE DESIRABLE CHARACTERISTICS OF LEADERSHIP

PERFORMANCE OBJECTIVE:

Given an introduction/orientation to desirable qualities of a good leader, describe characteristics typical of a good leader, discuss desirable leadership qualities, and demonstrate an ability to follow as well as take a leadership position. Performance should be satisfactory to the instructor and fellow students.

PERFORMANCE ACTIONS:

1.0201 Define (process of) leadership and why it is desirable in a job situation.

1.0202 Describe (minimum of five)* positive characteristics desirable in a good leader (based on instruction).

1.0203 Identify (three) basic steps to becoming a good leader.

1.0204 Identify (five) benefits from developing good leadership qualities.

1.0205 Demonstrate leadership qualities by participating as a fellow or member of a group and, if required, participating as a group leader.

*Standards of instructor apply.

PERFORMANCE STANDARDS:

- Participate as a contributing member of a group, such as the vocational class or VICA, and demonstrate desirable leadership qualities as outlined by the vocational program instructor.

SUGGESTED INSTRUCTION TIME: N/A

RELATED TECHNICAL INFORMATION:

- VICA Objectives.
- State Department of Education, District, and instructor supplied materials.

(NOTE: A student self-rating checklist may be used in evaluation and evaluation may include ratings by other students as well as by the instructor.)

Addendum to Task 1.02 C

LEADERSHIP RATING SCALE

DIRECTIONS: Check the appropriate parenthesis to indicate your impression of the leadership characteristics being rated.

		Not Observed	Needs Improvement	Observed
1.	Exerts positive leadership.	( )	( )	( )
2.	Thoughful of feelings of others.	( )	( )	( )
3.	Enthusiasm is sincere and contagious.	( )	( )	( )
4.	Perserves until job is completed.	( )	( )	( )
5.	Cheerful disposition.	( )	( )	( )
6.	Gets along well with team members.	( )	( )	( )
7.	Gets along well with instructor/ supervisor.	( )	( )	( )
8.	Reacts constructively to criticism.	( )	( )	( )
9.	Punctual and gets job assignment done on time.	( )	( )	( )
10.	Free from prejudice.	( )	( )	( )
11.	Enjoys being a part of a group.	( )	( )	( )
12.	Reliable.	( )	( )	( )
13.	Adaptive to most situations.	( )	( )	( )
14.	Not easily discouraged.	( )	( )	( )
15.	Applies self to problems of job assignment.	( )	( )	( )
16.	Admits mistakes when made.	( )	( )	( )
17.	Tries to understand the other fellow's point of view.	( )	( )	( )
18.	Makes decisions quickly and accurately.	( )	( )	( )
19.	Seeks advise of others when appropriate.	( )	( )	( )
20.	Looks for opportunities to make improvements in job or work assignments.	( )	( )	( )

STUDENT ______________________________

DATE _________________________________

RATING BY ____________________________

TASK 1.03 (Optional) PARTICIPATE IN VICA CLUB ACTIVITIES*

PERFORMANCE OBJECTIVE:

Given an introduction/orientation to the Vocational Industrial Club of America (VICA)*, describe the general purposes of VICA, describe a typical VICA program at a vocational center, recall from memory the VICA motto, state the VICA pledge from memory, identify the symbols/symbolism in the VICA emblem, identify what the colors of the VICA organization represent. Performance should be acceptable to the VICA Club sponsor, instructor, and VICA Club members.

*Or a alternate, approved student organization.

PERFORMANCE ACTIONS:

1.0301 Join the VICA Club sponsored by the Career Center and vocational program.

1.0302 Participate actively as a member or an officer in the local VICA Club.

1.0303 Describe the purpose of VICA.

1.0304 Recall from memory the VICA motto.

1.0305 State the VICA pledge from memory.

1.0306 Name a minimum of five beliefs the VICA creed emphasizes.

PERFORMANCE STANDARDS:

- Demonstrate orally or in writing, from memory, accurate recall of the VICA motto, pledge, and at least five of the six beliefs of the VICA creed, and described the purpose of VICA to the satisfaction of the VICA sponsor or VICA Club officers and members as well as to the satisfaction of the vocational program instructor.

SUGGESTED INSTRUCTION TIME: N/A

RELATED TECHNICAL INFORMATION:

- VICA publication(s).
- VICA emblem.
- VICA motto, pledge, and creed.
- Local VICA Club in Career Center.

UNIT 1.0 C JOB COMMUNICATIONS

TASK 1.03 (Con't.) (Optional) DEMONSTRATE PROPER USE OF PARLIAMENTARY PROCEDURE

PERFORMANCE OBJECTIVE:

Given instruction, apply the principles of parliamentary procedure and describe the characteristics of a good chairman.

PERFORMANCE ACTIONS:

1. Identify two basic principles upon which parliamentary procedure is based.
2. List two important characterists of a "good" chairman.
3. Define or identify types of motions.
4. Describe/identify the order of business for a meeting conducted by parliamentary procedure.
5. Describe/identify the characteristics of the kinds of motions used in conducting a typical meeting by parliamentary procedure.
6. Demonstrate ability to use parliamentary procedure correctly.

PERFORMANCE STANDARDS:

- Define parliamentary procedure and how it is used to contribute to a meeting, identify the charactistics of a good chairman, and used parliamentary procedures correctly meeting the standards of the instructor.

SUGGESTED INSTRUCTION TIME: N/A

(NOTE: "This activity should be integrated into VICA activities and objectives.")

RELATED TECHNICAL INFORMATION:

- Robert's Rules of Order.
- VICA Club.
- Public Speaking.

TASK 1.03 (Con't.) (Optional) COMMUNICATE A MESSAGE BY THE MEDIUM OF A SPEECH

PERFORMANCE OBJECTIVE:

Given instruction, list purposes of a speech, characteristics of a speech, and write and orally deliver a speech. The delivered speech should contain accurate information, be technically correct in organization and delivery, and the intended message should be communicated.

PERFORMANCE ACTIONS:

1. Identify three purposes for making a speech.
2. Write an outline for a proposed speech.
3. List at least five methods/ways to make a speech effective/interesting.
4. Deliver a three to five minute speech that successfully communicates the intended message.

PERFORMANCE STANDARDS:

- Successfully communicate intended message by a speech using proper techniques and meeting instructor's (or VICA sponsor's) standards.

ALTERNATE STANDARD:

- Student is to describe verbally, task being performed, techniques used, etc., to the instructor's standards.

SUGGESTED INSTRUCTION TIME: N/A

(NOTE: "This activity may be integrated into VICA activities and objectives.")

RELATED TECHNICAL INFORMATION:

- VICA Club.
- Communications.

UNIT 1.0 D

PREPARING FOR WORK

UNIT 1.0 D PREPARING FOR WORK

TASK 1.01 DESCRIBE THE FREE ENTERPRISE SYSTEM AND THE DIFFERENCE BETWEEN LABOR AND MANAGEMENT

PERFORMANCE OBJECTIVE:

Given an introduction/orientation to the free enterprise system of economics, describe to the satisfaction of the instructor the free enterprise system of economics as found in the United States and describe the relationship between labor and management.

PERFORMANCE ACTIONS:

1.0101 Read assignments in trade magazines or periodicals.

1.0102 Listen to talks by representatives of labor and management.

1.0103 Discuss the Free Enterprise System as represented by business/industry in the United States.

1.0104 Discuss problems concerning employee-management-trade union transactions.

PERFORMANCE STANDARDS:

- To the satisfaction of the instructor describe the Free Enterprise System of economics as represented by business/industry in the United States.

SUGGESTED INSTRUCTION TIME: N/A

RELATED TECHNICAL INFORMATION:

- Free Enterprise System of Economics.
- Management and Labor Relationships.

UNIT 1.0 D PREPARING FOR WORK

TASK 1.02 INTERPRET LABOR LAWS AND REGULATIONS

PERFORMANCE OBJECTIVE:

Given instruction, necessary references concerning labor laws and regulations, interpret typical labor laws and regulations. Performance must meet the instructor's standards.

PERFORMANCE ACTIONS:

1.0201	Identify and interpret the "Fair Labor Standards Act."
1.0202	State the minimum wage for a worker.
1.0203	State the typical minimum age for a worker.
1.0204	Identify how to report earned income.
1.0205	Define overtime.
1.0206	Identify local or State laws that affect the worker.

PERFORMANCE STANDARDS:

- Interpret typical labor laws and regulations of the Federal, State, and local level that affect the worker.
- The instructor's standards must be met.

SUGGESTED INSTRUCTION TIME: 1 Hour

UNIT 1.0 D PREPARING FOR WORK

TASK 1.03 INTERPRET PAYROLL DEDUCTIONS FOR TAXES, ETC.

PERFORMANCE OBJECTIVE:

Given instruction and sample forms concerning income tax and other withholdings, interpret the typical forms used in income tax and other withholdings to the satisfaction of the instructor and itemize typical payroll deductions that worker encounters. Performance must be to the instructor's standards.

PERFORMANCE ACTIONS:

1.0301 Obtain a social security card (if not acquired already). [Recommended]

1.0302 Identify the purposes of social security withholdings from pay.

1.0303 Describe who is qualified for unemployment compensation.

1.0304 Describe who qualifies for workmen's compensation.

1.0305 Complete typical forms used for Federal Income Tax Withholdings.

1.0306 Interpret a typical Federal Income Tax Wage and Tax Statement form.

1.0307 Identify typical payroll deductions.

PERFORMANCE STANDARDS:

- Given typical forms used for payroll deduction and reporting of income and other taxes, interpret payroll deductions and other statements on the forms.
- Performance must be to the instructor's standards.

SUGGESTED INSTRUCTION TIME: 1 Hour

UNIT 1.0 D PREPARING FOR WORK

TASK 1.04 IDENTIFY TYPICAL CAREER OPPORTUNITIES

PERFORMANCE OBJECTIVE:

Given instruction, data on the local business and industry, opportunities to study entry-level job opportunities; identify the major catagories of potential employers in the local community (and the key characteristics of each).

PERFORMANCE ACTIONS:

"Performance actions may vary from career center to career center due to the potential employers served and based on the emphasis of the individual vocational program."

PERFORMANCE STANDARDS:

- Identify typical types of entry-level jobs, in the local community, and the major characteristics that distinguish them based on given instruction, local market data, and student observation.
- Meet instructor's standards.

SUGGESTED INSTRUCTION TIME: 3 Hours

TASK 1.05 LOCATE JOB OPPORTUNITIES

PERFORMANCE OBJECTIVE:

Given job placement information such as newspaper ads and personal contacts, list a minimum of ten specific jobs in the community. One week will be allowed to complete the task.

PERFORMANCE ACTIONS:

1.0501 Identify job opportunity areas as related to training, skills, and interests.

1.0502 Contact (or list) various employment opportunity sources:

a. Job placement office.
b. Want ads.
c. Employment Security.
d. Other sources such as family, friends, school officials, etc.

1.0503 Estimate competition for job opportunities (number of other persons wanting same job) and target enough job opportunities to statistically qualify for one opportunity.

PERFORMANCE STANDARDS:

- Student must list a minimum of ten specific jobs in the community as advertised in the newspaper or media or through personal contacts.
- The jobs must be available currently.

SUGGESTED INSTRUCTION TIME: 3 Hours

(Skill development and performance to be demonstrated over one week.)

UNIT 1.0 D PREPARING FOR WORK

TASK 1.06 (Optional) PREPARE RESUME

PERFORMANCE OBJECTIVE:

Given examples of suitable resume/personal data sheets, prepare and type (or print at a minimum) a personal resume on paper acceptable to the instructor with all errors acceptable corrected.

PERFORMANCE ACTIONS:

1.0601 Define the basic purpose of the resume.

1.0602 Outline the essential information a resume of personal data sheet should contain:

a. Personal data such as name, address, telephone, age, physical descriptions, marital status, etc.
b. Job objective or skills offered.
c. Training.
d. Experience.
e. Accomplishments, interests, etc.
f. References.

1.0603 Prepare a resume that is acceptable to the instructor.

PERFORMANCE STANDARDS:

- Prepare resume/personal data sheets on paper and in a form acceptable to the instructor with all errors acceptable corrected.

SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Job Seeking - How and Where, Columbia, SC: South Carolina State Department of Education, 1981.

TASK 1.07 COMPOSE APPLICATION LETTER

PERFORMANCE OBJECTIVE:

Given a newspaper ad for a job, compose a letter of application. The letter must be mailable and must include all necessary personal information.

PERFORMANCE ACTIONS:

1.0701 Assemble necessary information, supplies, and equipment.

1.0702 Compose a letter of application for a given business position. Include the necessary information.

1.0703 Proofread the letter, correcting all errors.

PERFORMANCE STANDARDS:

- Compose a letter of application for a position advertised in the local newspaper and suitable for the skills and experience of the student or for the hypothetical position described by the instructor.
- Include necessary personal information and prepare the letter in mailable form.

SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Job Seeking - How and Where, Columbia, SC: South Carolina State Department of Education, 1981.

UNIT 1.0 D PREPARING FOR WORK

TASK 1.08 COMPLETE A TYPICAL EMPLOYMENT APPLICATION FORM

PERFORMANCE OBJECTIVE:

Given an employment application form typical of the job, complete the form with all information accurate, neatly typed or printed in, and aligned in the form blanks.

PERFORMANCE ACTIONS:

1.0801 Assemble minimum necessary information:

a. Personal information such as name, address, and date of birth.
b. Data related to applicant such as social security number, etc.
c. Schooling or training information.
d. Past employment record.
e. References.

1.0802 Complete the application form following directions carefully with neat, aligned entries.

1.0803 Proofread the completed form for errors or incomplete blanks.

PERFORMANCE STANDARDS:

- Complete an employment application form typical of the job with all information accurate, neatly printed or typed in and aligned in the form blanks to the instructor's standards.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Job Seeking - How and Where, Columbia, SC: South Carolina State Department of Education, 1981.

UNIT 1.0 D PREPARING FOR WORK

TASK 1.09 INTERVIEW FOR A JOB

PERFORMANCE OBJECTIVE:

Given instruction on how to interview for a job, a job interview checklist, and a mock job interview; complete a job interview to the satisfaction of the instructor.

PERFORMANCE ACTIONS:

1.0901 Prepare for the interview:

- a. Prepare personal appearance.
- b. Prepare necessary information, references, or other material for the interview.

1.0902 Arrive at the appropriate time and identify yourself and your purpose or appointment.

1.0903 Give a good impression in meeting the interviewer.

1.0904 Exchange essential information with the interviewer to reflect your job skills, training, and experience as well as your personality. In addition, learn about the job opportunity and employer.

PERFORMANCE STANDARDS:

- Complete a mock job interview to the satisfaction of the instructor following suggested procedures.

SUGGESTED INSTRUCTION TIME: 6 Hours

TASK 1.10 (Optional) COMPOSE FOLLOW-UP LETTER

PERFORMANCE OBJECTIVE:

Given a case situation by the instructor or from the textbook, compose and write a follow-up letter appropriate to the job application or interview situation and in mailable form. The finished letter must meet the instructor's standards.

PERFORMANCE ACTIONS:

1.1001	Assemble necessary information, supplies, and equipment.
1.1002	Compose a follow-up letter, in mailable form, to a given job application or interview situation.
1.1003	Proofread the letter, correcting all errors.

PERFORMANCE STANDARDS:

- Compose and write a follow-up letter appropriate in the judgement of the instructor to a given job application or interview situation and in mailable form.

SUGGESTED INSTRUCTION TIME: Optional

RELATED TECHNICAL INFORMATION:

- Job Seeking - How and Where, Columbia, SC: South Carolina State Department of Education, 1981.

UNIT 1.0 D PREPARING FOR WORK

TASK 1.11 IDENTIFY POST-SECONDARY CAREER DEVELOPMENT OPPORTUNITIES

PERFORMANCE OBJECTIVE:

Given an orientation to similar post-secondary career development programs, such as offered at Greenville Technical College, a report of skill competencies developed during secondary training, and other information as needed; identify post-secondary career development opportunities.

PERFORMANCE ACTIONS:

1.1101 Identify:

a. Need for additional training at the post-secondary level.
b. Benefits from additional training.

1.1102 a. Identify post-secondary training programs available at GTC.
b. Identify how post-secondary (GTC) training differs from secondary training in related areas.

1.1103 Visit GTC program of possible interest. Talk with instructor, department head, or admissions counselor at GTC.

1.1104 Determine, with secondary and post-secondary personnel assistance, if exemption of post-secondary level training is recommended.

1.1105 Accomplish the required steps to apply or test for exemptions (if applicable).

PERFORMANCE STANDARDS:

- Identify post-secondary training opportunities, specifically at GTC, to include: Associate Degree or Diploma in areas of possible career interest.

SUGGESTED INSTRUCTION TIME: 3 Hours

UNIT 1.0 E

INTRODUCTION TO DESIRABLE JOB/LEARNING CHARACTERISTICS/HABITS/ATTITUDES

UNIT 1.0 E INTRODUCTION TO DESIRABLE JOB/LEARNING CHARACTERISTICS/ HABITS/ATTITUDES

TASK 1.01 DESCRIBE GOOD WORK HABITS IMPORTANT TO JOB SUCCESS

PERFORMANCE OBJECTIVE:

Given introduction/orientation to desirable work habits, as described by potential employers or tradesmen, demonstrate desirable (good) work habits (based on information provided by the instructor) that represent typical standards expected by business/industry (potential employers) for entry employment success.

PERFORMANCE ACTIONS:

1.0101 Identify specific criteria for success in typical entry level job categories.

1.0102 Participate in planning student's learning activities.

1.0103 Maintain a clean, well-organized learning situation (desk, locker, work area, shop, etc.) which is conducive to effective learning.

1.0104 Objectively receive instructor or other critique (correction, criticism, suggestions, etc.) of learning or job performance (behavior) or product or activity.

1.0105 Describe good work habits and how they are related to job success, stability, and advancement.

PERFORMANCE STANDARDS:

- Describe to the instructor's standards good work habits that are important to job success, stability, and advancement.

SUGGESTED INSTRUCTION TIME: N/A

UNIT 1.0 E

INTRODUCTION TO DESIRABLE JOB/LEARNING CHARACTERISTICS/ HABITS/ATTITUDES

TASK 1.02

EXHIBIT SUCCESSFUL JOB PERFORMANCE CHARACTERISTICS

PERFORMANCE OBJECTIVE:

Given instruction, demonstrate job performance characteristics that are considered important to entry-level career success in the vocational field. A "Job Performance Rating Sheet" will be used to evaluate performance and all items must be rated "frequently" or above.

(NOTE: It is recommended in research findings that employer-recommended "job performance characteristics" and "work attitudes" be included as part of the vocational student's overall training and that demonstrated performance in these areas be included in the total evaluation of the student.)

PERFORMANCE ACTIONS:

1.0201 Review important work characteristics for the vocational field.

1.0202 Review the "Job Performance Rating Sheet" with the instructor.

1.0203 Demonstrate those work characteristics that are considered important to success in the vocational field.

PERFORMANCE STANDARDS:

- Demonstrate by personal performance the work characteristics that are considered important.
- A "Rating Sheet" will be used to evaluate performance and all items must be rated "frequently" (observed) or above.

SUGGESTED INSTRUCTION TIME: 3 Hours

Accompanied by addendum page (Rating Sheet)

Rating sheet might include the following categories:

- Accuracy of work
- Care of working space
- Care of equipment

Rating sheet (Con't.):

- Speed
- Use of working time
- Initiative
- Attendance
- Attitude toward fellow workers
- Attitude toward teacher
- Observance of safety rules
- Use of materials
- Responsibility
- Accident report
- Personal appearance, cleanliness

Addendum to Task 1.02 E

JOB PERFORMANCE RATING SHEET

Student ______________________ Job Performed ______________

Dates from ____________________ to ______________________

Place of work _________________ Supervisor ________________

DIRECTIONS: Circle the number that best fits your opinion of the student's performance using the following factors:

		Never	Seldom	Frequently	Usually	Always
1.	Gets to work on time	1	2	3	4	5
2.	Uses time properly	1	2	3	4	5
3.	Shows interest in work	1	2	3	4	5
4.	Shows dependability	1	2	3	4	5
5.	Is ambitious	1	2	3	4	5
6.	Is neat (work and self)	1	2	3	4	5
7.	Works well with others	1	2	3	4	5
8.	Follows directions	1	2	3	4	5
9.	Works without supervision	1	2	3	4	5
10.	Shows good manners	1	2	3	4	5
11.	Meets people well	1	2	3	4	5
12.	Uses knowledge on the job	1	2	3	4	5
13.	Seeks assistance, when necessary	1	2	3	4	5

Does the worker have the skills for doing satisfactory work?
Yes __ No __

List the skills or characteristics that need to be developed or improved upon:

____

____

____

____

Additional comments:

____

____

____

____

____

Date __________________ Supervisor ___________________________

UNIT 1.0 E

INTRODUCTION TO DESIRABLE JOB/LEARNING CHARACTERISTICS/ HABITS/ATTITUDES

UNIT 1.03

EXHIBIT DESIRABLE WORK ATTITUDES

PERFORMANCE OBJECTIVE:

Given instruction, demonstrate work attitudes that the majority of potential employers prefer in an entry level worker. Performance will be evaluated on a "Work Attitudes Score Card" and a minimum of 90 percent should be attained. Performance will be rated throughout training and should improve to 100 percent by the end of the training period.*

PERFORMANCE ACTIONS:

1.0301	Review work attitudes considered important to success in the vocational field.
1.0302	Review the "Work Attitudes Score Card."
1.0303	Demonstrate the type of work attitudes that potential employers in the local industry report as important to job success.

PERFORMANCE STANDARDS:

- Demonstrate to 90 percent acceptable rating on a "Work Attitudes Score Card" to be completed by the instructor those work attitudes considered important by local potential employers for entry-level job success.

SUGGESTED INSTRUCTION TIME: 3 Hours

Accompanied by addendum page (Work Attitudes Score Card)

(*NOTE: It is recommended in research study findings that employer-recommended "job performance characteristics" and "work attitudes" be included as part of the training and that demonstrated performance in these areas be included in the total evaluation of the student.)

Addendum to Task 1.03 E

WORK ATTITUDES SCORE SHEET

DIRECTIONS: Score the student on the following attitudes and work behavior by circling the appropriate description either "yes" (+) or "no" (-). Indicate any comments to support the rating or recommendations.

	Circle		Comments/
	(No)	(Yes)	Recommendations
Cooperative	–	+	
Courteous	–	+	
Loyal to program study and job team members	–	+	
Tackful	–	+	
Self Disciplined	–	+	
Respectful	–	+	
Alert	–	+	
Motivated	–	+	
Responsible	–	+	
Trustworthy	–	+	
Dependable	–	+	
Cheerful	–	+	
Polite	–	+	
Interest	–	+	
Friendly	–	+	
Sympathetic (sensitive) to fellow students	–	+	
Accepts changes	–	+	
Follows rules and regulations	–	+	
Does share of work	–	+	
Helps others, if needed	–	+	
Works regularly	–	+	
On time	–	+	
Shows pride in work	–	+	
Keeps promises	–	+	
Does not waste time	–	+	
Controls anger	–	+	
Accepts criticism	–	+	
Follows superior's directions	–	+	

28 Items total TOTAL (+'s) ________

INTERPRETATION

28 = 100% = Level 4
25 = 90% = Level 3
22 = 80% = Level 2
20 = 70% = Level 1
17 = 60% = Level 0

Student: ________________________________

UNIT 1.0 E INTRODUCTION TO DESIRABLE JOB/LEARNING CHARACTERISTICS/HABITS/ATTITUDES

TASK 1.04 DEMONSTRATE RESPECT FOR AND CARE OF SCHOOL PROPERTY

PERFORMANCE OBJECTIVE:

Given a classroom, shop, or other instructional setting with access to furniture, equipment, tools and materials, and given proper instruction; demonstrate a respect for and care of public property (training facilities) and instructional materials to the standards established by The School District of Greenville County, the career center, and the instructor.

PERFORMANCE ACTIONS:

1.0401 Listen to information provided by the instructor and read given or posted materials concerning student behavior and care of property.

1.0402 Demonstrate respect for and care of public school property including:

a. Facilities (building, classroom).
b. Furnishing (furniture).
c. Equipment and tools.
d. Instructural materials.

PERFORMANCE STANDARDS:

- Demonstrate respect for and care of school property as represented by the classroom, shop, equipment, tools and materials used in instruction.
- Performance must be to the standards of policies of the School District, the career center, and the instructor.

(NOTE: A willful disregard or disrespect (intentional damage or destruction) of instructional facilities, equipment, or materials should be considered a most serious situation since an employer typically would require payment for intended damages and might fire the employee or bring legal charges against the employee for intentional damage to facilities, equipment, or materials.)

SUGGESTED INSTRUCTION TIME: N/A Integrated during two-year training period.

UNIT 1.0 F

BASIC MATH SKILLS

TASK 1.01 BASIC MATH - FRACTIONS

PERFORMANCE OBJECTIVE:

Given a pretest or examples by the instructor, conduct the following operations with fractions:

1. Change any fraction to a decimal number, and any terminating decimal number to a fraction.
2. Arrange in order...unit and simple nonunit fractions.
3. Write equivalent fractions in higher, lower, and lowest terms.
4. Write improper fractions as whole or mixed numbers, and mixed numbers as improper fractions.
5. Multiply fractions and mixed numbers, expressing answers in simplest form.
6. Divide fractions and mixed numbers, expressing answers in simplest form.
7. Add and subtract unlike fractions, expressing answers in simplest form.
8. Add and subtract mixed numbers with unlike fractions, expressing answers in simplest form.
9. Use rational numbers to solve simple work problems.

PERFORMANCE ACTIONS:

Consult: Curriculum Guide for High School General Mathematics, Greenville, SC: The School District of Greenville County, 1979.

PERFORMANCE STANDARDS:

- Student should be able to complete pretest in Math Curriculum Guide with 90 percent accuracy.
- Consult the Math Curriculum Guide for pretests, suggested exercises, and references.

(NOTE: The level of this math skill is eighth grade, General Math I.)

SUGGESTED INSTRUCTION TIME: 18 Hours (Actual hours of instruction will be determined by student's math skill as indicated by pretest. Remedial instruction may be at initiation of skill development if required.)

PERFORMANCE OBJECTIVE:

Given a pretest or examples by the instructor, conduct the following decimal math operations:

1. Name the place value of digits in decimal numbers of up to nine digits before the decimal and six digits after the decimal.
2. Compare decimal numbers and arrange them in order.
3. Write the numeral for any decimal number of up to four decimal places.
4. Round decimal numbers to any designated place value up to thousandths.
5. Add and subtract decimal numbers of up to six digits.
6. Multiply decimal numbers by whole numbers or decimal numbers.
7. Divide a number by a three-digit decimal number.
8. Multiply and divide decimal numbers by powers of ten, by inspection.

PERFORMANCE ACTIONS:

Consult: Curriculum Guide for High School General Mathematics, Greenville, SC: The School District of Greenville County, 1979.

PERFORMANCE STANDARDS:

- Student should be able to complete pretest in Math Curriculum Guide with 90 percent accuracy.
- Consult: Curriculum Guide for High School General Mathematics, 1979, for pretests, suggested exercises, and references.

SUGGESTED INSTRUCTION TIME: 6 Hours (Actual hours of instruction will be determined by the student's math skill as indicated by pretest. Remedial instruction may be at initiation of skill development if required.)

(NOTE: The level of this math skill is eighth grade, General Math I.)

TASK 1.03 BASIC MATH - VOLUMES

PERFORMANCE OBJECTIVE:

Given a pretest or examples by the instructor, find the volume of any rectangular prism or cube.

PERFORMANCE ACTIONS:

Consult: Curriculum Guide for High School General Mathematics, Greenville, SC: The School District of Greenville County, 1979.

PERFORMANCE STANDARDS:

- Student should be able to complete pretest in Math Curriculum Guide with 90 percent accuracy.
- Consult: Math Curriculum Guide for pretests, suggested exercises, and references.

SUGGESTED INSTRUCTION TIME: 3 Hours (Actual hours of instruction will be determined by the student's math skills as indicated by pretest. Remedial instruction may be at initiation of skill development if required.)

(NOTE: The level of this math skill is eighth grade, General Math I.)

UNIT 1.0 F — BASIC MATH SKILLS

TASK 1.04 — BASIC MATH - Areas

PERFORMANCE OBJECTIVE:

Given a pretest or examples by the instructor, find the area of the following types of figures:

a. Rectangle and square
b. Circle

PERFORMANCE ACTIONS:

Consult: Curriculum Guide for High School General Mathematics, Greenville, SC: The School District of Greenville County, 1979.

PERFORMANCE STANDARDS:

- Student should be able to complete pretest in Math Curriculum Guide with 90 percent accuracy.
- Consult the Math Curriculum Guide for pretests, suggested exercises, and references.

SUGGESTED INSTRUCTION TIME: 3 Hours (Actual hours of instruction will be determined by the student's math skill as indicated by pretest. Remedial instruction may be at initiation of skill development if required.)

(NOTE: The level of this math skill is eighth grade, General Math I.)

SAMPLE
OUTCOME-REFERENCED TESTS

This articulated, performance-based instruction guide is designed to answer three critical questions necessary for quality instruction.

First, what should be taught?

> The objectives of the articulated, performance-based vocational education program are based on extensive task analysis and validation.
>
> The task objectives represent what employers in business and industry say is important for entry level job success.

Second, how should it be taught?

> It should be taught using the latest "state-of-the-art" instructional technology incorporated into each unit.
>
> Students are taught the knowledges, skills, and attitudes needed for successful and productive employment.

Third, how should students be evaluated?

> Students are evaluated using a validated, competency-based approach to determine student proficiency in vocational knowledges and skills.
>
> The minimum standards are those required for successful entry into the next higher level of training or for successful employment.

The sample tests in this guide are included to illustrate how a student's competency in vocational skills and knowledges may be measured with validity and reliability. In addition, the test samples should promote standardization in the evaluation of vocational students in similar programs.

Test items have been constructed solely from the objectives of the vocational program. The statement of the objectives indicate the level of knowledge or skill to be tested. Task force committee participants have attempted to develop tests that agree with objectives in the behavior requested, the given conditions, and the desired standards of performance.

NOTE: Unless a test is marked "Revised" or "R," the test should be considered a field trial edition currently under evaluation.

Unit 1.0 F

STUDENT: ________________________________ DATE: ____________

Solve basic ratio and proportion problems.

1. What would be the proportions if the mix 1:2:12 were cut in half?

   ____

2. What would be the proportion if the mix 1:1:3 were tripled?

   ____

3. You are asked to mix a batch of mortar using 1:1:6 ratio, but you will need six times this amount. What proportions of materials will be needed?

   ____

4. A mixture of 1 part cement, 1 part lime, and 3 parts sand is needed to make 25 cubic feet of mortar. How many cubic feet of each are needed?

   ____

5. Using a 1:3 ratio, how many cubic yards of sand will be needed for 27 bags of mortar?

   ____

Study the statements below and select the correct answer to each statement and mark in the space provided.

6. Find area of a wall that is 72 feet long and 14 feet high.

   _____ a. 908 sq. ft.
   b. 1,008 sq. ft.
   c. 1,108 sq. ft.

7. A wall has 592 square feet of surface with 71 square feet of openings. What is the total square feet of area that will be covered by brick?

   _____ a. 521 sq. ft.
   b. 621 sq. ft.
   c. 721 sq. ft.

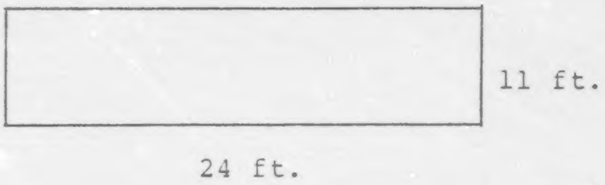
8. A floor to be paved with bricks is 72 feet wide and 86 feet long. What is the total square feet of area to be covered with brick pavers?

_____ a. 5,992 sq. ft.
b. 6,092 sq. ft.
c. 6,192 sq. ft.

Calculate the area below and select the correct answer to each drawing and mark in the space provided.

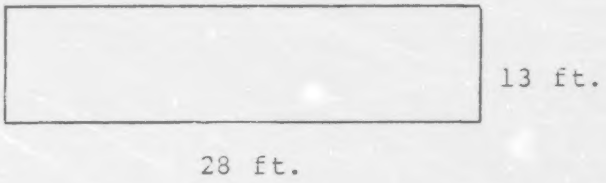
9. Calculate the following problem dealing with area using the formula given. Length x Width = Area

_____ a. 254 sq. ft.
b. 264 sq. ft.
c. 274 sq. ft.



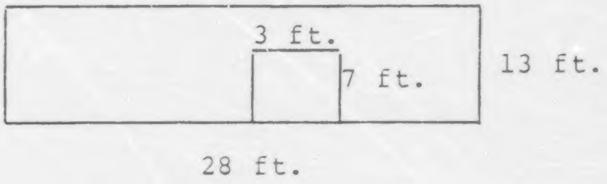
10. Calculate the following problem using the formula given. Height x Length = Area

_____ a. 344 sq. ft.
b. 354 sq. ft.
c. 364 sq. ft.



11. Calculate the square area, less door, to be bricked.

_____ a. 343
b. 353
c. 363



UNIT 1.0 G

BASIC MEASURING

TASK 1.01 MEASURING

PERFORMANCE OBJECTIVE:

Given proper instructions, read a rule and use other measuring tools with the precision necessary to take measurements or set them up.

PERFORMANCE ACTIONS:

1.0101 Define measuring terms with 80 percent accuracy.

1.0102 Accurately identify basic tools used in measuring.

1.0103 Read a rule to the nearest feet, inches, and fractions of inches down to 1/16 inch.

1.0104 Demonstrate ability to perform following measuring skills:

a. Measure objects to nearest sixteenth of an inch when given pictures of objects and a measuring instrument.
b. Draw lines and objects to specified dimensions.

PERFORMANCE STANDARDS:

- Demonstrate ability to measure to 1/16 inch and draw lines or objects to specified dimensions (1/16 inch accuracy).

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Graduations on rule: Halves, quarters, eighths, sixteenths.
- Rules: Tapes (steel or other), folding rule, straight rule, steel square.
- Metric measurement.

EXPANSION OF TASK:

- a. Estimate a measurement to 1/32 inch.
- b. Measure using the metric system.

DEFINITIONS

MEASURING	Setting of limits or bounds according to a pre-determined standard.
INCH	Smallest whole unit of lineal measure typically used.
FOOT	Unit of measure consisting of twelve equal parts called inches.
FRACTION	One or more equal parts of a whole. (i.e., 1/2 inch, 1/4 inch, 3/8 inch, and 5/16 inch)
RULE	Instrument graduated in whole units and fractions of units and used in measuring.
DIMENSION	Number of full units and fraction of units between two points.

UNIT 2.0

MASONRY TOOLS AND EQUIPMENT

The purpose of this unit is to prepare the brick masonry student to identify and match masonry hand tools to their specific uses and to properly use and care for hand tools.

In addition, the student will be able to identify and properly select and use and care for power tools and equipment for masonry jobs.

Masonry tools and equipment training will be extended to related equipment to prepare the student to identify and properly use and care for related equipment, including scaffolding.

MASONRY
TOOLS AND EQUIPMENT
SUGGESTED INSTRUCTION TIMES

MASONRY UNIT/TASK		SUGGESTED HOURS
Unit 2.0	TOOLS AND EQUIPMENT	
2.01	Demonstrate Use of Masonry Hand Tools	6
2.02	Identify and Use Related Equipment in Masonry	6
2.03	Read Modular and Spacing Rules	6
2.04	Set Up Scaffolding	12
2.05	Use Story Pole	**
	TOTAL HOURS	30

**See Unit 9.0, Task 9.03

TASK LISTINGS
MASONRY

UNIT/TASK	DESCRIPTION
Unit 2.0	TOOLS AND EQUIPMENT
2.01	(Demonstrate Use of Masonry Hand Tools) Given instruction, common masonry hand tools, and situation in which to demonstrate use of hand tools; demonstrate proper selection, use and care of masonry hand tools.
2.02	(Identify and Use Related Equipment in Masonry) Given instruction, related masonry equipment, and situation in which student may demonstrate introductory knowledge and skill in identification and use of the equipment; identify and use related equipment to instructor's standards.
2.03	(Read Modular and Spacing Rules) Given mason's modular and spacing rules, instruction concerning their use, practice time, and a practical situation in which to use the modular and spacing rules; demonstrate proper and accurate use of the mason's modular rule and spacing rule to the instructor's standards.
2.04	(Set Up Scaffolding) Given the necessary tools, equipment, and materials to build metal scaffolding; build/erect a section of tubular steel scaffold. The scaffold must be built to specifications of the National Safety Council and must be able to support the load to be supported.
2.05	(Use Story Pole) See Task 9.03 in Unit 9.0, Brick Construction Techniques.

UNIT 2.0 MASONRY TOOLS AND EQUIPMENT

TASK 2.01 DEMONSTRATE USE OF MASONRY HAND TOOLS

PERFORMANCE OBJECTIVE:

Given instruction, common masonry hand tools, and situation in which to demonstrate use of hand tools, demonstrate proper selection, use and care of masonry hand tools.

Suggested Hand Tools:
- Jointers: Flat, Round, Beaded, Rake, Tuck Pointer, Grapevine, Sled Runner
- Hammers: Brick, Tile, Plug or Mash
- Rules: Brick Spacing Rule, Modular Spacing Rule
- Alignment Tools: { Mason's Line, Line Block, Chalk Line, Trig, Line Pin
- Trowels:
- Miscellaneous: Square, Tape Rule, Wire or Bolt Cutter, Brick Set (chisel), Mason's Tool Bag*

*Typical Mason's Tool Bag may contain:
- Large trowel
- Pointing trowel
- Round and V jointer
- Brick hammer
- Brick set chisel
- Mason's Line
- Corner Blocks
- Line pins
- Folding Rule
- Cut nails
- Steel Tape
- Short plumb rule
- Chalk pencils, knife, safety goggles, mason's brush, etc.

PERFORMANCE ACTIONS:

2.0101 Identify basic masonry hand tools common to the Mason's Tool Bag or brickmasonry.

2.0102 Demonstration proper selection, use and care of hand tools.

2.0103 Identify safety care with hand tools.

PERFORMANCE STANDARDS:

- Select masonry hand tools by proper terminology and demonstrate proper use and care of hand tools typically carried/used by the brickmason.

TASK 2.01 DEMONSTRATE USE OF MASONRY HAND TOOLS

PERFORMANCE STANDARDS (Con't.):

- Instructor's standards must be met.
- Safety procedures and care of hand tools must be demonstrated.
- (See below for suggested minimum task performance.)

(NOTE: Introductory task. Competency typically will not be gained in the use of hand tools until the student has had the opportunity for training experience and competency may not be demonstrated by some students until the second year of training has been completed.)

SUGGESTED INSTRUCTION TIME: 6 Hours

SUGGESTED MINIMUM PERFORMANCE DEMONSTRATION FOR INITIAL HAND TOOL TRAINING

1. Smooth mortar joint with jointer to instructor's standards.
2. a. Strike brick set with hammer to cut brick.
   b. Cut brick with trowel. (With care to avoid injury.)
   c. Cut brick with hammer.
3. Apply, spread, shape, or smooth mortar with trowel.
4. Layout a chalk line to instructor's specifications.
5. Use Line Blocks, to establish a horizontal line, and move line (line blocks) up the corner to check the succeeding course without measuring the line again.
6. Secure a line at both ends of a course height using the Line Pin or Line Block (or nail).
7. Establish a plumb line and a level line with the level or plumb rule.
8. a. Layout and space a standard brick course to a height that is not modular using the course counter spacing rule.
   b. Make given measurements using the modular spacing rule.

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UNIT 2.0 MASONRY TOOLS AND EQUIPMENT

TASK 2.02 IDENTIFY AND USE RELATED EQUIPMENT IN MASONRY

PERFORMANCE OBJECTIVE:

Given instruction, related masonry equipment, and situation in which student may demonstrate introductory knowledge and skill in identification and use of the equipment, identify and use related equipment to instructor's standards.

Suggested Related Equipment:
- Brick tongs
- Wooden Body Wheelbarrow, Brickbarrow, Flatbed
- Contractor's Wheelbarrow
- Mortar Mixing Box (about 32" x 60")
- Mortar Pan (and stand) about 30" square
- Mortar Board (measuring about 30" square) (wood, fiberglass, metal)
- Mortar mixing tools: Shovels, Mortar Hoe, Hose pipe, and water pail or drum
- Portable Masonry Saw (optional)
- Stationary Masonry Saw
- Power Mortar Mixer
- Corner Pole

PERFORMANCE ACTIONS:

2.0201 Identify and select related equipment for masonry tasks.

2.0202 Demonstrate proper use and care of related masonry equipment.

2.0203 Demonstrate special knowledge and skill and safety precautions needed with use of masonry saws, masonry block splitter, and gasoline powered mortar mixer.

PERFORMANCE STANDARDS:

- Identify, demonstrate proper use and care of related masonry equipment and special safety precautions to instructor's standards.

NOTE: Proficiency in use of related equipment may require training experience. Training will be integrated into later described task.

(See addendum to this task objective for suggested minimum standards.)

SUGGESTED INSTRUCTION TIME: 6 Hours

SUGGESTED MINIMUM PROFICIENCY TO DEMONSTRATE ORIENTATION KNOWLEDGE/SKILL IN RELATED EQUIPMENT

1. Demonstrate correct method of carrying bricks using brick tongs set for 7 bricks to transfer a stack of bricks from one location to another market location in a stack acceptable to the instructor.

2. Use the Contractor's Wheelbarrow to carry mortar mix or sand to a given location with no spills.

3. Use the Wooden body wheelbarrow to transport bricks from one location to another, loading and unloading and transporting the brick with no loss or damage.

4. Mix mortar using the mortar mixing box.

5. Use the mortar pan and mortar board to hold mortar.

6. Mix mortar using mortar hoe and other necessary tools.

7. Observing correct safety precautions and shop procedures, check for proper blade, and operate the masonry saw to cut brick to specifications and demonstrate proper care of masonry saw.

8. Following safety precautions, shop procedures, and manufacturer's instructions; operate the power mortar mixer to demonstrate orientation knowledge and skill.

SAFETY PRACTICES FOR USE OF MASONRY SAW[1]

1. No horseplaying around masonry saw.
2. Operator and others near saw wear safety hard hats.
3. Inspect saw frame/stand for proper electrical ground.
4. Stand on wooden platform to prevent grounding of operator.
5. Do not stand in water while operating saw.
6. Inspect saw for correct blade, properly installed.
7. Wear proper clothing, recommended by instructor (no loose clothing, no rings, etc.).
8. Wear proper eye protection.
9. Avoid touching metal objects nearby to prevent shock hazards.
10. Inspect saw for safe electrical wiring (no frayed wires).
11. Check that blade is clear prior to starting.
12. Use waste piece of masonry, etc., for close cuts to keep fingers from blade.
13. Wear rubber outer wear to prevent getting wet and possible electric shock.
14. Allow blade to cut at normal speed; don't force the cut.
15. Be sure block is flat on table without chips, etc., so unit will not bind or kick back.
16. Use miter gauge when cutting angles.
17. When cutting with dry blade, make use of wind to carry dust from operator (use exhaust fan if available), use a dust mask.
18. If the saw blade binds in a cut, do not attempt to hold or grab it: Let it go.
19. Do not cut a cracked masonry unit.
20. Do not operate the saw when ill.

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[1] Kreh, R. T., Sr. Advanced Masonry Skills, Albany, NY: Delmar Publishers, Inc., pp. 69-70, 1978.

TASK 2.03 READ MODULAR AND SPACING RULES

PERFORMANCE OBJECTIVE:

Given mason's modular and spacing rules, instruction concerning their use, practice time, and a practical situation in which to use the modular and spacing rules; demonstrate proper and accurate use of the mason's modular rule and spacing rule to the instructor's standards.

PERFORMANCE ACTIONS:

2.0301 Demonstrate use of the MODULAR rule:

a. Check specifications to determine course height or brick size.
b. Determine number of 8" or 16" courses (6 courses of standard brick equal 16").
c. Read each reference number (6 courses in 16" = reference number 6 for height of each course).
d. Transcribe reference number to standard rule to determine exact course height (reference number 6 = 2 21/32").
e. If applicable, mark the story pole using each reference number.

2.0302 Demonstrate use of SPACING rule:

a. Check specifications to determine course height (e.g., 2 3/4") or brick size.
b. Determine height to be filled.
c. Transcribe space to be filled to spacing rule.
d. Read each reference number to determine course height.
e. Mark story pole with reference number.

PERFORMANCE STANDARDS:

- Read modular and spacing rule to instructor's standards.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Read standard rule.
- Identify modular and spacing rules.
- Describe divisions/markings on modular rule.

RELATED TECHNICAL INFORMATION (Con't.):

- Describe divisions/marking on spacing rule.
- Read specifications.
- Describe how to determine course height.
- Describe how to transcribe reference numbers.
- Describe how to construct a story pole.

TASK 2.04 SET UP SCAFFOLDING

PERFORMANCE OBJECTIVE:

Given the necessary tools, equipment, and materials to build metal scaffolding; build/erect a section of tubular steel scaffold. The scaffold must be built to specifications of the National Safety Council and must be able to support the load to be supported.

PERFORMANCE ACTIONS:

2.0401	Demonstrate safety precautions.
2.0402	Identify types of scaffolds and select proper type for job.
2.0403	Follow the Standard Safety Code for Building Construction as to types of material to be used.
2.0404	Determine size of scaffold to be built.
2.0405	Select proper footing, level, or plumb area.
2.0406	Brace at all points provided, tie scaffold to structure.
2.0407	Install catwalks or platforms.
2.0408	Attach double guard rails.

PERFORMANCE STANDARDS:

- Set up scaffolding, the minimum to include a section of tubular steel scaffolding, that meets the specifications of the National Safety Council and build to support the load to be carried.

SUGGESTED INSTRUCTION TIME: 12 Hours

RELATED TECHNICAL INFORMATION:

- Identify safety considerations.
- Identify common types of scaffolds (types typically used or rented locally).
- Review Standard Safety Code for Building Construction concerning types of materials recommended for scaffolding.
- Determine size of scaffold to be built for given situation.
- Describe how to set up a given type of scaffold.

UNIT 2.0 MASONRY TOOLS AND EQUIPMENT

TASK 2.05 USE STORY POLE

See Task 9.03 in Unit 9.0, BRICK CONSTRUCTION TECHNIQUES.

STUDENT: ______________________________ DATE: ______________

Select the most correct choice to answer each statement below.

1. The tool used in the middle of a wall to keep it plumb, level, and straight is a __________.

   a. level
   b. trig
   c. line block

2. The tool used to hold a line at the corner is a __________.

   a. trig
   b. line block
   c. square

3. When laying out a wall on a concrete floor, you should use a __________ when laying off a lone wall.

   a. chalk box
   b. level
   c. line pin

4. The most important bricklayer's tool is the __________.

   a. level
   b. trowel
   c. spacing rule

5. The part of the trowel that must be kept clean is the __________.

   a. steel blade
   b. handle
   c. heel

6. Keep the __________ of the level clean.

   a. end
   b. window
   c. side

7. To check the level for accuracy, use a __________.

   a. square
   b. story pole
   c. level

8. Care of the wooden level can be achieved by rubbing it with __________.

   a. cylinder oil
   b. linseed oil
   c. burnt oil

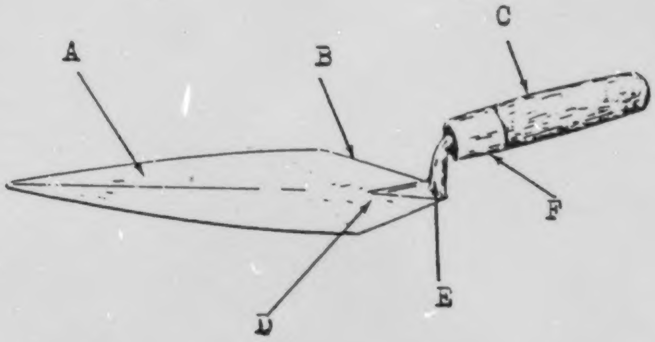
9. Study the statements about trowels to the right and select the best matching answer for the words on the left.

		Choices
A. Handle	___	a. Rounded extention as the heel.
B. Heel	___	b. Wooden part of the trowel.
C. Shank	___	c. Metal band surround shank end of handle.
D. Ferrule	___	d. Wide or near end of trowel.
E. Blade	___	e. Shank of trowel.

10. Using the proper terminology, identify the parts of a brick trowel indicated by the arrows.

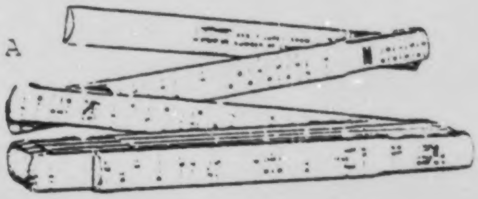
a. ______________
b. ______________
c. ______________
d. ______________
e. ______________
f. ______________

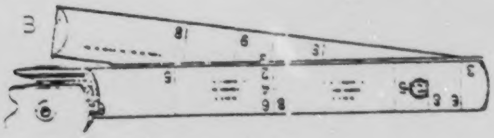
Parts of a Brick Trowel



11. Identify the following rules used in masonry.

a. ______________
b. ______________





12. Below are illustrated several types of jointers. Match the correct name from the right hand column with the pictures of the jointers. Answer in the spaces provided.

A ____________

B ____________

C ____________

D ____________

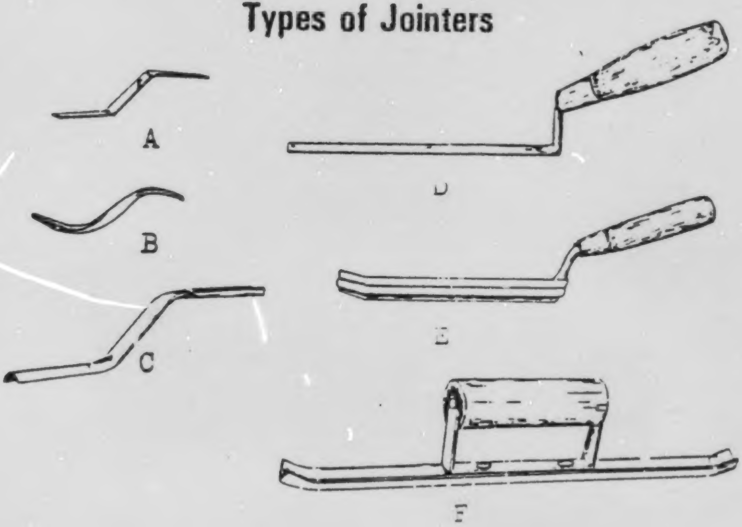
E ____________

F ____________

Choices

- grapevine
- rake
- beaded
- round
- tuck pointer
- sled runner
- flat
- trig
- S-jointer
- standard

Types of Jointers



13. Match the correct names from the right hand column with the illustrations of masonry alignment tools on the left. Answer in the spaces provided.

A ______________

B ______________

C ______________

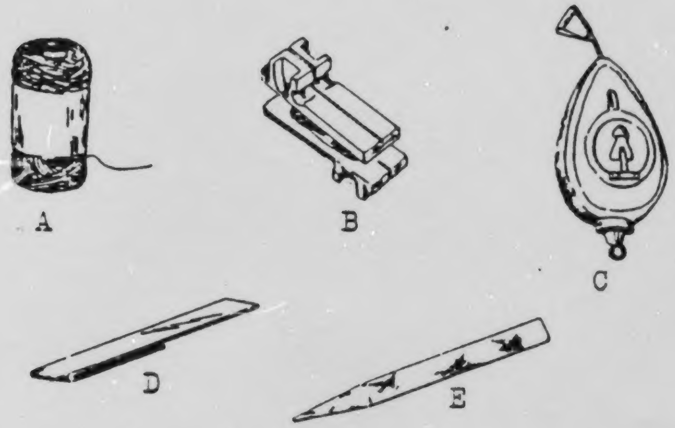
D ______________

E ______________

Choices

chalk box
mason's line
trig line
line block
line pin
trig
pointer

Tools for Alignment



14. Match the words on the left with the most suitable description on the right.

Choices

A. Wet masonry saw operation
B. Dry masonry saw operation

a. Silicon carbine blade
b. Diamond chip blade

A. __________

B. __________

STUDENT: ______________________________ DATE: ______________

PERFORMANCE TEST

SUGGESTED MINIMUM PERFORMANCE DEMONSTRATION FOR INITIAL HAND TOOL TRAINING

Acceptable	Not Acceptable		
( )	( )	1.	Smooth mortar joint with jointer to instructor's standards.
( )	( )	2.	a. Strike brick set with hammer to cut brick. b. Cut brick with trowel. c. Cut brick with hammer.
( )	( )	3.	Apply, spread, shape, or smooth mortar with trowel.
( )	( )	4.	Layout a chalk line to instructor's specifications.
( )	( )	5.	Use Line Blocks, to establish a horizontal line, and move line (line blocks) up the corner to check the succeeding course without measuring the line again.
( )	( )	6.	Secure a line at both ends of a course height using the Line Pin or Line Block (or nail).
( )	( )	7.	Establish a plumb line and a level with the level or plumb rule.
( )	( )	8.	a. Layout and space a standard brick course to a height that is not modular using the brick spacing rule. b. Make given measurements using the modular spacing rule.
( )	( )	9.	Correctly applied modular and spacing rules to given situations and demonstrated proper use of modular and spacing rules.

Instructor ______________________________

STUDENT: ______________________________ DATE: __________

PERFORMANCE TEST

SUGGESTED MINIMUM PROFICIENCY TO DEMONSTRATE ORIENTATION KNOWLEDGE/SKILL IN RELATED EQUIPMENT

A	N		
( )	( )	1.	Demonstrate correct method of carrying bricks, using brick tongs set for 7 bricks, to transfer a stack of bricks from one location to another marked location and stack them in away acceptable to the instructor.
( )	( )	2.	Use the Contractor's Wheelbarrow to carry mortar mix or sand to a given location with no spills.
( )	( )	3.	Use the Wooden body wheelbarrow to transport bricks from one location to another, loading and unloading and transporting the brick with no loss or damage.
( )	( )	4.	Mix mortar using the mortar mixing box.
( )	( )	5.	Use the mortar pan and mortar board to hold mortar.
( )	( )	6.	Mix mortar using mortar hoe and other necessary tools.
( )	( )	7.	Observing correct safety precautions and shop procedures, check for proper blade and operate the masonry saw to cut brick to specifications and demonstrate proper care of masonry saw.
( )	( )	8.	Following safety precautions, shop procedures, and manufacturer's instruction; operate the power mortar mixer to demonstrate orientation knowledge and skill.

A = Acceptable

N = Not Acceptable

Instructor ______________________________

UNIT 3.0

INTRODUCTION TO BLUEPRINT READING

INTRODUCTION TO BLUEPRINT READING

MINIMUM SUGGESTED TERMINOLOGY

ALPHABET OF LINE	Standardized symbols covering all lines needed to represent the shape and size of object.
ARCHITECT's SCALE	Rule divided into proportional feet and inches, with a fraction of an inch proportionally equal to one foot (e.g., 1/2 inch per foot).
ARCHITECTURAL DRAWING	Graphic representation shown with lines and symbols.
SHOP DRAWING	Plans showing detailed information of specific items.
BLUEPRINT	Copy of original detailed drawing.
DETAIL	Drawing giving complete detailed information concerning an element of construction.
DIMENSIONS	Lines and symbols arranged to indicate the actual size for constructing the object represented.
ELEVATION	Drawing representing the front, sides, or rear of a structure.
PLAN VIEW	Diagram showing a horizontal view of a structure, such as floor and sectional plans.
SECTION	Drawing that is cut to show internal construction.
SPECIFICATIONS	Detailed set of written instructions concerning a drawing: Specifications describe type and quality of materials and equipment to be used in the structure.

MASONRY
INTRODUCTION TO BLUEPRINT READING
SUGGESTED INSTRUCTION TIMES

MASONRY UNIT/TASK		SUGGESTED HOURS
Unit 3.0	INTRODUCTION TO BLUEPRINT READING	
3.01	Identify Working Drawings and Blueprint and Read Specifications	6
3.02	Interpret Common Blueprint Symbols	6
3.03	Interpret Dimensions from Blueprints	3
3.04	Read Blueprint and Specifications and Estimate Materials for Job	21
	TOTAL HOURS	36

TASK LISTINGS
MASONRY

UNIT/TASK	DESCRIPTION
Unit 3.0	INTRODUCTION TO BLUEPRINT READING
3.01	(Identify Working Drawings and Blueprint and Read Specifications) Given an orientation to working drawings, blueprints, and specifications; differentiate between working drawings, blueprints, and specifications.
3.02	(Interpret Common Blueprint Symbols) Given instruction concerning common blueprint symbols, a set of simple blueprints using the symbols, and an assignment to identify common symbols typically used in the occupational field; recognize different blueprint symbols with 100 percent accuracy and meeting the instructor's standards.
3.03	(Interpret Dimensions from Blueprints) Given instruction, Architect's Scale or drawing, blueprint representations, and an assignment to interpret the blueprint with 1/16 inch accuracy.
3.04	(Read Blueprint and Specifications and Estimate Materials for Job) Given blueprint for a job, a requirement to layout/plan a job from the blueprint and specify job materials needed to complete the work, accurately read the blueprints and specifications and estimate the materials for the job with 95 percent accuracy. Depending on the instructor's requirements, an accuracy of 1/16 to 1/64 inch in measuring is expected and final work must meet the instructor's standards.

UNIT 3.0 INTRODUCTION TO BLUEPRINT READING

TASK 3.01 IDENTIFY WORKING DRAWINGS AND BLUEPRINT AND READ SPECIFICATIONS

PERFORMANCE OBJECTIVE:

Given an orientation to working drawings, blueprints, and specifications; differentiate between working drawings, blueprints, and specifications.

PERFORMANCE ACTIONS:

3.0101	Identify working drawings.
3.0102	Identify blueprints. Explain the relationship between blueprints and working drawings.
3.0103	Identify specifications.
3.0104	Read specifications (orientation training). (As an integrated task during training, "extract specific information from a prepared set of specifications.")

PERFORMANCE STANDARDS:

- On a written knowledge test, identify with 70 percent accuracy a working drawing, blueprint, and specifications and the relationship between working drawings and blueprints.
- (Integrated task: Extract specific information with specifications, meeting instructor's standards.)

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Introductory related training (orientation) to zoning, building/trade permits, codes, and inspections.
- Working drawings: Orthographic, Pictorials, and Sections
- Interpret Alphabet of Lines.

UNIT 3.0 INTRODUCTION TO BLUEPRINT READING

TASK 3.02 INTERPRET COMMON BLUEPRINT SYMBOLS

PERFORMANCE OBJECTIVE:

Given instruction concerning common blueprint symbols, a set of simple blueprints using the symbols, and an assignment to identify common symbols typically used in the occupational field; recognize different blueprint symbols with 100 percent accuracy and meeting the instructor's standards.

PERFORMANCE ACTIONS:

3.0201 Identify common blueprint symbols used in the occupational field.

3.0202 Interpret symbols used in blueprints typical to the occupational field and that the entry-level worker typically would encounter.

3.0203 Identify commonly used abbreviations used in drawings and blueprints. (Familiarization)

PERFORMANCE STANDARDS:

- Interpret common building symbols used on blueprints and drawings in the occupational field with an accuracy of 100 percent and meeting the standards of the instructor.
- Identify commonly used abbreviations used in drawings, blueprints, and specifications.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- American Institute for Architects (AIA) symbols.
- American standards plumbing symbols.

UNIT 3.0 INTRODUCTION TO BLUEPRINT READING

TASK 3.03 INTERPRET DIMENSIONS FROM BLUEPRINTS

PERFORMANCE OBJECTIVE:

Given instruction, Architect's Scale or drawing, blueprint representations, and an assignment to interpret the blueprint with 1/16 inch accuracy.

PERFORMANCE ACTIONS:

3.0301 Identify Architect's Scale and its use.

3.0302 Identify methods of dimensioning on blueprints.

3.0303 Interpret dimensions on blueprints and sketches.

PERFORMANCE STANDARDS:

- Interpret dimensions on blueprints and sketches with 1/16 inch.
- Meet instructor's standards.

SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Scales used on blueprints.
- Scaling drawings in occupational field.
- Measuring scaled lines.

UNIT 3.0 INTRODUCTION TO BLUEPRINT READING

TASK 3.04 READ BLUEPRINT AND SPECIFICATIONS AND ESTIMATE MATERIALS FOR JOB

PERFORMANCE OBJECTIVE:

Given blueprints for a job, a requirement to layout/plan a job from the blueprints and specify job materials needed to complete the work, accurately read the blueprints and specifications and estimate the materials for the job with 95 percent accuracy. Depending on the instructor's requirements, an accuracy of 1/16 to 1/64 inch in measuring is expected and final work must meet the instructor's standards.

PERFORMANCE ACTIONS:

3.0401 From given blueprints, layout assigned job with layout meeting the dimensions measured by the instructor within 1/16 or 1/64 inch.

3.0402 From blueprints and specifications, specify the materials required to complete the work.

3.0403 From blueprints, specifications, and assignment information, determine the proper tools and equipment needed to complete the job.

(NOTE: This action may be integrated with estimating. Estimating may be treated as a separate task or integrated with occupational math.)

PERFORMANCE STANDARDS:

- Given blueprint and specifications and a job assignment, determine the material requirements and estimate the cost of the material.

SUGGESTED INSTRUCTION TIME: 21 Hours

RELATED TECHNICAL INFORMATION:

- Reading blueprints.
- Reading specifications.
- Measuring.

RELATED TECHNICAL INFORMATION (Con't.):

- Layout.
- Suppliers of material.
- Reading and interpreting "notations" on drawings.

TASK COMPETENCY:

- Given a masonry blueprint of a small building, locate doors and windows, identify types of bricks, blocks, and concrete, and list various dimensions. Determine masonry materials for job.

Unit 3.0

STUDENT: ________________________________ DATE: ____________

Match the terms on the bottom to the correct definitions.

_____ 1. Drawing of an object that has been cut to show internal construction.

_____ 2. Detailed set of written instructions which explains the drawing, describes materials and equipment used in the structure as to quality and type, and becomes part of the contract.

_____ 3. Arbitrary sign that has been standardized and is used to represent an object, quality, or method.

_____ 4. Graphic representation shown with lines and symbols.

_____ 5. Drawing that gives complete detailed information for an element of construction.

_____ 6. Set of conventional symbols covering all the lines needed to depict an object as to size and shape.

_____ 7. Arrangement of lines and symbols to indicate the actual size for constructing the object that is represented.

_____ 8. Drawing representing the front, sides, or rear face of a structure and usually made as though the observer were looking directly at it.

_____ 9. Drawing made to a size either proportionally larger or smaller than the actual size of the object represented.

_____ 10. Plans showing detailed information of specific items.

TERMS

a. Alphabet of lines
b. Architect's scale
c. Architectural drawing
d. Blueprint
e. Detail
f. Dimensions
g. Elevation

h. Plan view
i. Scale drawing
j. Section
k. Specifications
l. Symbol
m. Shop drawing

Unit 3.0

STUDENT: ______________________ DATE: __________

Match the blueprint choices on the right with the items on the left to indicate where the items typically would be found in blueprints and specifications. If an item on the left may be found in more than one plan, select the plan which gives the best view.

____ 1. Masonry openings for windows.

____ 2. Height of chimney above roof.

____ 3. Location of driveway.

____ 4. Layout of partition wall.

____ 5. Electrical layout.

____ 6. Flashing layout.

____ 7. Pier to support steel beam for first floor

____ 8. Placement of wall ties in masonry wall.

____ 9. Height of fireplace mantel.

____ 10. Outside wall showing installation of doors and windows

a. plot plan

b. floor and foundation plan

c. elevation view

d. sectional plan

e. detail drawings

Unit 3.0

STUDENT: ______________________________ DATE: ______________

PERFORMANCE TESTS:

1. On a blueprint or drawing provided by the instructor, identify the following symbols and other symbols required by the instructor.

   a. Concrete
   b. Cut stone
   c. Slate
   d. Brick
   e. Concrete block
   f. Earth
   g. Plywood
   h. Finished wood
   i. Structural clay tile
   j. Steel

PERFORMANCE EVALUATION

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

2. Demonstrate accuracy in reading the following: Performance must be to the instructor's standards.

a. Read a blueprint.

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

b. Read a plan view.

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

c. Interpret a finish schedule.

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

d. Read a structural plan.

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

e. Interpret a set of brick masonry specifications.

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

UNIT 4.0

MIXING MORTAR

On completing this unit, the student, using the proper terminology, will be able to correctly select the appropriate ingredients of mortar and will be able to mix the desired color and texture of mortar either by hand or motor mixer methods and will be able to order and evaluate premixed mortar.

MIXING MORTAR

MINIMUM SUGGESTED TERMINOLOGY

CONSISTENCY	Amount of wetness and workability of mortar.
DURABILITY	Ability to withstand wear, abrasion, and weathering.
WORKABILITY	When mortar is easily handled with trowel.
PORTLAND CEMENT	Mixture of burned clay and limestone finely ground for making concrete or mortar.
MORTAR	Plastic mixture of cementing materials, aggregate, and water.
AGGREGATE	Stone or gravel used as part of concrete is course aggregate while sand is considered a fine aggregate.
MASONRY CEMENT*	Mill-mixed combination of portland cement, lime, and additives. *(Masonry mortar mix.)
EFFLORESCENCE	Deposit (generally white) of water-soluble salts on surface of masonry wall.
CEMENT	Material mixed with water which makes up a paste which binds the aggregate particles into a strong solid mass. Used to adhere one body, such as a brick, to another.

MASONRY
MIXING MORTAR
SUGGESTED INSTRUCTION TIMES

MASONRY UNIT/TASK		SUGGESTED HOURS
Unit 4.0	MIXING MORTAR	
4.01	Mix Mortar by Hand	4
4.02	Mix Mortar With Mechanically-Powered Mixer	4
4.03	Select Basic Materials	4
4.04	Set Up Mortar Boards and Place Mortar	2
4.05	Spread Mortar	13
	TOTAL HOURS	27

TASK LISTINGS
MIXING MORTAR

UNIT/TASK	DESCRIPTION
Unit 4.0	MIXING MORTAR
4.01	(Mix Mortar by Hand) Given mortar mixing ingredients to include sand, portland cement, and hydrated lime, water, mortar mixing box, mortar mixing tools and other necessary materials; mix mortar by hand to the desired consistency.
4.02	(Mix Mortar With Mechanically-Powered Mixer) Using a mechanically-powered mortar mixer, tools and equipment, supplies, and mix specifications provided; mix masonry cement mortar in power mixer. The finished mortar must be of uniform color and of the desired texture to slide gradually from the trowel.
4.03	(Select Basic Materials) Given instruction, a selection of ingredients such as portland cement, mortar mix, lime, sand, and water; identify the main characteristics of different ingredients and select the most appropriate ones for given masonry jobs.
4.04	(Set Up Mortar Boards and Place Mortar) Given mortar boards, mortar and the necessary tools, equipment, and materials; set up mortar boards and place mortar. Mortar boards must be set up of standard spacing distances and the mortar must be placed in the center of the boards.
4.05	(Spread Mortar) Given a trowel, mortar, and mortar board; spread mortar for brick evenly, at least 24 inches in one spread (depending on environmental conditions, brick texture, etc.).

UNIT 4.0 MIXING MORTAR

TASK 4.01 MIX MORTAR BY HAND*

PERFORMANCE OBJECTIVE:

Given mortar mixing ingredients to include sand, portland cement, and hydrated lime, water, mortar mixing box, mortar mixing tools and other necessary materials; mix mortar by hand to the desired consistency.

(*NOTE: Most masonry mortar will be mixed by portable mechanical mixers; however, small jobs may require mortar mixing by hand.)

PERFORMANCE ACTIONS:

4.0101 Assemble and prepare tools, equipment, and materials for mixing mortar.

4.0102 Put one-half desired quantity of sand in clean, level mortar box.

4.0103 Use mill-run mortar mix.**

Or spread specified quantity of hydrated lime and portland cement over sand. (See Related Technical Information also.)

4.0104 Add remainer of sand to permit more thorough mixing with less effort.

4.0105 Turn dry mixture at least twice with hoe and pull to one end of box.

4.0106 Add water and cut dry mixture into it.

4.0107 Continue water until desired consistency reached.

PERFORMANCE STANDARDS:

- Mix mortar by hand, using tools, equipment, and materials provided, to consistency desired and meeting instructor's standards (color and texture).

SUGGESTED INSTRUCTION TIME: 4 Hours

RELATED TECHNICAL INFORMATION:

- Types of mortar and characteristics.
- Storage of mortar (unused mortar).
- Mortar mixing tools.
- Safety precautions in mixing mortar.
- Mixing problems: proportioning (too much water, sand, cement), old cement (lumps, hard), mixing in cold temperatures, time after which mortar is/cannot be used.

**Training mixture may omit cement, mixing 1 part lime to 2.5-3 parts sand, typically.

UNIT 4.0 MIXING MORTAR

TASK 4.02 MIX MORTAR WITH MECHANICALLY-POWERED MIXER

PERFORMANCE OBJECTIVE:

Using a mechanically-powered mortar mixer, tools and equipment, supplies, and mix specifications provided; mix masonry cement mortar in power mixer. The finished mortar must be of uniform color and of the desired texture to slide gradually from the trowel.

PERFORMANCE ACTIONS:

4.0201 Assemble machine, tools, equipment, and materials for mixing mortar.

4.0202
- a. Check mixing machine for safety: No trash in drum, safety guard down on drum.
- b. Wear safety glasses.
- c. Student must be checked out by instructor prior to operating the power mixer and must have the instructor's permission to operate the power mixer. (Proper procedures must be followed.)

4.0203 Place a small amount of water in the drum to prevent mixture from bailing or caking on machine paddles.

4.0204
- a. Add 1/2 - 1/3 required amount of sand.
- b. Add mortar mix; or, if required:
  - (1) Add all required amount of lime.
  - (2) Add all required amount of cement. (Mixer operating at this time to prevent strain on motor.)

4.0205 With paddles turning:
- a. Add additional sand.
- b. Add water for desired consistency.

4.0206 After all ingredients are in drum, mix for a minimum of 3 minutes (3-5 minutes mix).

4.0207 Upon completing mix, with paddles running, completely empty mortar in mortar box. (NOTE: Take paddles out of gear, shut mixer off, before scraping remaining mortar from drum.)

PERFORMANCE ACTIONS (Con't.):

4.0208 Wash drum to clear remaining mortar (if needed, mixer may be started again to help clean mortar from paddles and drum).

4.0209 With mixer off, scrub drum with brush to clean it.

4.0210 Return clean mixer to proper storage.

PERFORMANCE STANDARDS:

- Demonstrate correct safety practices and operational procedures in using the mechanically-powered mixer to prepare mortar to desired color and texture (consistency).

SUGGESTED INSTRUCTION TIME: 4 Hours

RELATED TECHNICAL INFORMATION:

- Prolonged mixing may result in excessive air in mortar making it spongy.
- Mixing problems: proportioning (too much water, sand, cement), old cement (lumps, hard), mixing in cold temperatures, time mortar allowed to sit unused.
- Safety.
- Mixing mortar in cold temperatures (heating mortar, etc.).
- Mix may be portioned by using 1 cubic foot box.
- Proper handling of mechanically-powered mixer.
- Prepare mixer for storage by:
    - oil according to instructor's standards
    - grease designated moving parts

UNIT 4.0 MIXING MORTAR

TASK 4.03 SELECT BASIC MATERIALS

PERFORMANCE OBJECTIVE:

Given instruction, a selection of ingredients such as portland cement, mortar mix, lime, sand, and water; identify the main characteristics of different ingredients and select the most appropriate ones for given masonry jobs.

(NOTE: Orientation Task)

PERFORMANCE ACTIONS:

4.0301	Identify portland cement.
4.0302	Identify the effects of hydrated lime on mortar including bond strength, workability, water retention, tensile strength, flexibility, stress flexibility, minimal change in volume, weather resistance.
4.0303	Identify the difference between natural and manufactured sand and the characteristics of sand in mortar mix.
4.0304	Explain what to consider in selecting water for mortar mixing.
4.0305	a. Select the best type of mortar from types M, S, N, and O for a given job. b. Explain importance of proper water content in mortar. c. Explain how to prevent efflorescence in masonry work.

PERFORMANCE STANDARDS:

- Select appropriate basic materials for the mixing of mortar.
- Performance must be to the instructor's standards.

SUGGESTED INSTRUCTION TIME: 4 Hours

RELATED TECHNICAL INFORMATION:

- Portland cement.
- Principal types of portland cement-hydrated lime mortars including Types N, M, S, and O.

UNIT 4.0 MIXING MORTAR

TASK 4.04 SET UP MORTAR BOARDS AND PLACE MORTAR

PERFORMANCE OBJECTIVE:

Given mortar boards, mortar and the necessary tools, equipment, and materials; set up mortar boards and place mortar. Mortar boards must be set up of standard spacing distances and the mortar must be placed in the center of the boards.

PERFORMANCE ACTIONS:

4.0401 Identify various materials that can be used as mortar boards.

4.0402 Explain the proper method for spacing mortar boards.

4.0403 Explain the reason for wetting the board and placing mortar in the center of the board.

PERFORMANCE STANDARDS:

- Set up mortar board approximately 2 feet minimum of standard spacing (location) and place mortar in center of prepared board.
- Performance must be to instructor's standards.

SUGGESTED INSTRUCTION TIME: 2 Hours

RELATED TECHNICAL INFORMATION:

- Mixing mortar.

UNIT 4.0 MIXING MORTAR

TASK 4.05 SPREAD MORTAR

PERFORMANCE OBJECTIVE:

Given a trowel, mortar, and mortar board; spread mortar for brick evenly, at least 24 inches in one spread (depending on environmental conditions, brick texture, etc.).

PERFORMANCE ACTIONS:

4.0501 Identify, select, and demonstrate use of small, medium, and large trowels.

4.0502 Describe proper method for holding a trowel.

4.0503 Describe the procedures for throwing up head joints and spreading mortar:

a. Mix mortar.
b. Wet mortar board.
c. Place mortar on board.
d. Pick up with trowel.
e. Distribute mortar.
f. Furrow mortar.
g. Seal mortar to trowel.

PERFORMANCE STANDARDS:

- Spread mortar evenly for at least 24 inches in one spread using the small, medium, and large trowels (trowel of uniform size for mason) to instructor's standards.

SUGGESTED INSTRUCTION TIME: 13 Hours

RELATED TECHNICAL INFORMATION:

- Parts of trowel.
- Use of trowels: Small, medium, and large.
- Safety precautions/procedures.
- Techniques of handling mortar (instructor's standards apply).

Unit 4.0

STUDENT: ______________________________ DATE: ____________

Select the most correct choice to answer each statement.

1. The tool used by the laborer to carry bricks is the ____.

   a. Power buggy
   b. Brick tongs
   c. Conveyor

2. When weather conditions are hot and dry and may cause mortar to set too rapidly, add mixtures which are called ___.

   a. Retardants
   b. "slow-downs"
   c. "delayers"
   d. a, b, and c

3. The property of mortar which prevents rapid loss of water to masonry units of high suction and prevents "bleeding" when mortar is in contact with relatively impervious units is called water _____.

   a. sensitivity
   b. retentivity
   c. economy
   d. hydrolosis

4. It is generally recommended that mortar materials be warmed and Type III (high early strength) mortar be used in cold weather work below ___ degrees.

   a. 45
   b. 40
   c. 35
   d. 30

5. Hydrated lime is packaged in 50 lb. bags which contain approximately ___ cubic feet of lime.

   a. 1
   b. 1.5
   c. 2
   d. 3

6. Portland cement is available in bags containing 1 cubic foot of cement weighing ____ pounds.

   a. 54
   b. 64
   c. 84
   d. 94

7. When mixing 1:1:6 mortar, for every six cubic feet of mix, use one bag of cement, one bag of lime, and _____.

   a. 1 cubic foot of sand
   b. 3 cubic feet of sand
   c. 6 cubic feet of sand

8. Regardless of the natural clay burned in the klin in the brickmaking process, if it contains a high degree of iron as it burns it will turn _____.

   a. yellow
   b. green
   c. brown
   d. red

9. The act of mortar hardening or setting is directly related to which of the following terms? _____

   a. Flashing
   b. Striking
   c. Absorbing
   d. Bleeding

10. The ability of mortar to retain water for a long period of time and to possess good workability is primarily due to the use of _____.

   a. portland cement
   b. fine sand
   c. lime
   d. additives

11. The term "tempering up," as used in the masonry trade, means _____.

   a. heating metal
   b. adding water to mortar to make it more workable
   c. pouring of mortar into the cavity wall for greater strength.
   d. adding portland cement to mortar to increase the strength

12. The term "drowning the mortar" means ____.

   a. adding too much water to mortar
   b. preparing grout for a reinforced wall
   c. preparing mortar with too much cement
   d. mixing mortar for use in underwater masonry

Select the appropriate items from the lists after each statement that are true for or that apply to the statements.

13. Mortar consistency is affected by the following factors.

yes	no		
( )	( )	a.	air temperature
( )	( )	b.	wind
( )	( )	c.	freezing

14. Identify the effects of salt on masonry.

yes	no		
( )	( )	a.	Water used for mixing mortar should be clean.
( )	( )	b.	Sand with a large amount of salt will help the appearance of the wall.
( )	( )	c.	Efflorescence on masonry walls requires extra man-hours for cleaning.
( )	( )	d.	Efflorescence makes a wall more attractive.

15. Given materials, tools, and equipment for mixing mortar by hand, identify the sequence of mixing of mortar by hand by arranging the following steps in proper order.

a. Add sand.
b. Mix by cutting with mixing hoe and pulling toward end.
c. Secure leak-proof mortar box.
d. Add about one-half water required.
e. Add cement on top of sand.
f. Cut ingredients at least three times.
g. Continue to mix mortar by cutting and adding water until proper consistency is acquired.
h. Add lime on top of cement and sand.

1. ____
2. ____
3. ____
4. ____
5. ____
6. ____
7. ____
8. ____

16. To mix mortar using a mechanical mixer, arrange the following steps in the correct sequence.

a. Add one-half of required sand as the mixing action continues.
b. Add approximately one-half of water required.
c. Add more water.
d. Add cement.
e. Add remainder of sand.
f. Add water to mix to proper consistency.
g. Add lime.

1. ____
2. ____
3. ____
4. ____
5. ____
6. ____
7. ____

STUDENT: ______________________________ DATE: ____________

PERFORMANCE TEST

Given a trowel, mortar, and mortar board; spread mortar for brick evenly, at least 24 inches in one spread if environmental conditions are satisfactory. Performance must be to instructor's standards and all items on a performance checklist must be acceptable.

CHECKLIST

A	N	
☐	☐	1. Mixed mortar.
☐	☐	2. Wet mortar board.
☐	☐	3. Placed mortar on board.
☐	☐	4. Picked up mortar with trowel.
☐	☐	5. Distributed mortar.
☐	☐	6. Furrowed mortar.
☐	☐	7. Sealed mortar to trowel.
☐	☐	8. Accomplished task in time period acceptable to instructor.

A = Acceptable

N = Not acceptable

Instructor ______________________________

UNIT 5.0

BASIC BRICKLAYING, JOINTING, AND POINTING
(And Keeping a Bond)

BASIC BRICKLAYING, JOINTING, AND POINTING
(And Keeping a Bond)

MINIMUM SUGGESTED TERMINOLOGY

MORTAR BOND	Adhesion of mortar to masonry unit, wall ties, or other reinforcement.
STRUCTURAL BOND	Interlocking of masonry units to each other to distribute weight of wall.
PATTERN BOND	Arrangement of masonry units to form a pattern, design, or texture.
DRY BOND	Laying out masonry units without mortar to determine the fit in a given area without cutting brick.
SPREADING MORTAR	Placing mortar on course being laid.
STORY POLE	Length of wood marked for course levels or course heights.
HEAD JOINT	Vertical mortar joint between ends of masonry units.
BED JOINT	Horizontal layer of mortar on which masonry unit is laid.
TRIG TOOL	Tool used to prevent line sag and to prevent line movement from wind.
LEAD	Wall section built up and racked back on successive courses.
MASON'S LINE	Nylon or other line used to keep bricks level, straight, and plumb.
RANGE LINE	Line used to keep masonry units in true alignment from corner to corner.
CORNER POLE	Tool used to establish or check corners and courses of masonry.
JOINTER	Tool used to form joints in masonry work.
RACKING BACK	Method of stepping back successive courses of masonry.
STRETCHER COURSE	(Running bond) Course of brick with length of units parallel to face of wall.
FULL HEADER	(Common bond) Bond in which every sixth course is a header course, and intervening courses are stretcher courses (may be varied).

MASONRY
BASIC BRICKLAYING, JOINTING, AND POINTING
SUGGESTED INSTRUCTION TIMES

MASONRY UNIT/TASK		SUGGESTED HOURS
Unit 5.0	BASIC BRICKLAYING, JOINTING, AND POINTING	
5.01	Estimate Brick Masonry Units	6
5.02	Lay a Rowlock Course	18
5.03	Identify Three Structural Bonds Used in Construction	3
5.04	Dry Bond a Wall	3
5.05	Hand Cut and Power Saw Brick	6
5.06	Cut a Bat Closure	3
5.07	Lay a Stretcher Course to Line (Running Bond)	6
5.08	Lay a Full Header Course to Line (Common, American)	6
5.09	Layout a Stack Bond Wall	9
5.10	Orientation to Flemish Bond	3
5.11	Orientation to English Bond	3
5.12	(OPTIONAL) Lay a Diamond Bond Wall	3
5.13	Lay a Brick Corner	24
5.14 A	Orientation to Building a Dutch Corner	6
5.14 B	Orientation to Building an English Corner	6
5.15	Tool Concave Joints	3
5.16	Tool Rake Joints	3
5.17	Tool V-Joints	3
5.18	Tool Convex Joints	2

5.19	Orientation to Flush Finish Joints	1
5.20	Construct a 4 Inch Rack-Back Lead in Running Bond	12
5.21	Construct an Outside and Inside Brick Corner for a 4 Inch Wall in Running Bond	12
5.22	Lay Brick Corner and Build a Wall in Running Bond With Line	24
5.23	(OPTIONAL) Orientation* to Waterproof a Brick Wall	1
5.24	Clean Brick Walls	6
	TOTAL HOURS	172

TASK LISTINGS
MASONRY

UNIT/TASK	DESCRIPTION
Unit 5.0	BASIC BRICKLAYING, JOINTING, AND POINTING
5.01	(Estimate Brick Masonry Units) Given length and height of various walls, specifications as necessary; estimate the number of brick masonry units required to construct the desired walls using the modular system. Estimate(s) must be within 10 percent of instructor's predetermined estimate and must identify the correct type and size of bricks according to specifications.
5.02	(Lay a Rowlock* Course) Given the necessary tools, equipment, and materials, brick and mortar; lay a rowlock* course. The course must be straight and level with no holes or cracks and the joints must be smooth and full joints.
5.03	(Identify Three Structural Bonds Used in Construction) Given specific examples of the three structural bonds used in construction; identify designated bonds.
5.04	(Dry Bond a Wall) Given mortar, tools, and bricks; dry bond and interlock masonry units. Embed metal ties in connecting the joints as required.
5.05	(Hand Cut and Power Saw Brick) Given cutting specifications, bricks, a masonry saw, and a brick hammer and set; cut masonry units to +/- 1/8 inch of required size.
5.06	(Cut a Bat Closure) Given necessary tools, equipment, and supplies, cut a bat (half brick) closure. Performance process must be acceptable to instructor and product must be cut straight and equal the predetermine size +/- 1/2 inch.
5.07	(Lay a Stretcher Course to Line [Running Bond]) Given plans and specifications, brick and mortar, and the necessary equipment, tools, and supplies; lay a stretcher course*. All bricks must be laid level with the line and 1/16 inch or daylight from the line with all head joints within 3/8 to 1/2 inch.
5.08	(Lay a Full Header Course to Line [Common, American]) Given plans and specifications for a common bond wall, brick and mortar, and necessary equipment, tools, and supplies; lay a common (American) bond with full headers. Wall must be laid on a 6 gage or 4 courses

to 11 inches with full headers every 6th course. Wall must be level, plumb, straightedged, ranged, jointed, and pointed.

5.09 (Layout a Stack Bond Wall) Given plans and specifications for stack bond wall, bricks, mortar, and the necessary tools, equipment, and materials; lay a stack bond wall. The pattern must be uniform, the wall must be plumb, straight, and level, within +/- 1/16 inch of specifications for length, height, and width, and have uniform joints.

5.10 (Orientation to Flemish Bond) Given plans and specifications for Flemish bond, bricks and mortar, and the necessary tools, equipment, and materials; lay a Flemish bond wall (for orientation) with Dutch corners. The patterns must be distinctive and uniform, the wall must be plumb, straight, and level, within +/- 1/16 inch of specifications for length, height, and width, with uniform joints.

5.11 (Orientation to English Bond) Given plans and specifications for English bond, bricks and mortar, and the necessary tools, equipment, and materials; lay an English bond wall (for orientation). The patterns must be distinctive and uniform, the wall must be plumb, straight, and level, within +/- 1/16 inch of specifications for length, height, and width, with uniform joints.

5.12 (Lay a Diamond Bond Wall) Given plans and specifications for a diamond bond wall, bricks, mortar and the necessary tools, equipment and materials; lay an 8 inch diamond pattern wall. The wall must be laid on 6 or 4 to 11 with closers occurring every 4th course when opening the diamond and stretchers occurring every 4th course when closing the diamond. The pattern must be uniform, the wall must be plumb, level, straightedged, ranged, jointed, and free of cracks and holes, within +/- 1/16 inch of specifications for length, height, and width.

5.13 (Lay a Brick Corner) Given plans and specifications for a brick wall, mortar, and the necessary tools and materials; lay a brick corner. The corners must be square, level, plumb, and straightedge, with +/- 1/16 inch of specifications for height and width, have uniform courses, and laid on the specified scale.

5.14 A (Orientation to Building a Dutch Corner) Given instruction, specifications, tools, equipment, and materials, brick and mortar; build a Dutch corner which is square and plumb, meeting instructor's standards.

5.14 B (Orientation to Building an English Corner) Given tools and materials, brick and mortar, and instructions; build a return corner in English bond. Product must be accurate, square, and plumb.

5.15 (Tool Concave Joints) Given necessary equipment, tools, and supplies, instruction and specifications, and masonry work to tool; tool concave joints. All joints must be uniformly concave and smooth with no double imprints.

5.16 (Tool Rake Joints) Given masonry tools, equipment, and supplies, instruction and specifications, masonry work to tool; tool rake joints so they are uniformly raked, smooth, clean, free of holes and to the depth stated in the specifications.

5.17 (Tool V-Joints) Given necessary equipment, tools, and supplies, instruction and specifications, jointer; tool V-joints. All joints must be uniformly V-tooled and smooth with no double imprints.

5.18 (Tool Convex Joints) Given masonry equipment, tools, supplies, and specifications; tool convex joints. All joints must be uniformly convex and smooth with no double imprints.

5.19 (Orientation to Flush Finish Joints) Given instruction, equipment, tools, materials, and masonry to finish; flush finish joints for orientation. Meet instructor's standards for performance and product.

5.20 (Construct a 4 Inch Rack-Back Lead in Running Bond[1]) Given instruction, specifications, equipment, tools, and materials, bricks and mortar; layout and build a 4 inch brick rack-back lead in the running bond. Demonstrate the proper skills in leveling, plumbing, and building to a specified height.

5.21 (Construct an Outside and Inside Brick Corner for a 4 Inch Wall in Running Bond[1]) Given instruction, specifications, equipment, tools, and materials, brick and mortar; layout and build an outside and inside corner 9 courses high in the running bond. Build the outside corner first and the inside corner second.

5.22 (Lay Brick Corner and Build a Wall in Running Bond With Line[1]) Given instruction, specifications for job, equipment, tools, materials, brick and mortar; build brick leads and a 4 inch wall in the running bond, maintaining a uniform thickness of all head and bed joints. Construction of corners and laying bricks to line must be accomplished to the instructor's standards for process and product.

5.22 (Lay Brick Corner and Build a Wall in Running Bond With Line[1]) Given instruction, specifications for job, equipment, tools, materials, brick and mortar; build brick leads and a 4 inch wall in the running bond, maintaining a uniform thickness of all head and bed joints. Construction of corners and laying bricks to line must be accomplished to the instructor's standards for process and product.

5.23 (Orientation* to Waterproof a Brick Wall) Given a brick wall requiring waterproofing and access to necessary tools, equipment, and materials; waterproof the brick wall. The correct waterproofing material and techniques must be selected and applied according to specifications and the walls must be completely sealed.

5.24 (Clean Brick Walls) Given cleaning product recommended, brushes, plastic pail, water hose, water supply and cleaning information; mix product and clean brick according to manufacturer's specifications.

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.01 ESTIMATE BRICK MASONRY UNITS

PERFORMANCE OBJECTIVE:

Given length and height of various walls, specifications as necessary; estimate the number of brick masonry units required to construct the desired walls using the modular system. Estimate(s) must be within 10 percent of instructor's predetermined estimate and must identify the correct type and size of bricks according to specifications.

PERFORMANCE ACTIONS:

5.0101 Describe the "wall area method" or "square foot method."

5.0102 a. Use formular for estimating square feet.
Wall length x wall height = total square feet
(NOTE: Estimate on running bond, omit consideration for header.)
b. Estimate brick units by multiplying total square feet by 7 (6.75 or 7 bricks/ sq. ft.).

EXTENSION OF TASK: (Option)

5.0103 Estimate masonry cement using 8 bags/1,000 bricks (about 1 bag/125 bricks) for calculation.

5.0104 Estimate sand based on 1 ton/1,000 bricks, to the nearest 1/2 ton over the amount estimated.

5.0105 Estimate materials costs in job: Total cost of bricks, cement, sand, and total cost of combined materials.

5.0106 Estimate labor costs based on given information and wage scales for a job requiring 5,000 bricks, (1 mason lays about 675 bricks per 8 hour day).

PERFORMANCE STANDARDS:

- Estimate required brick masonry units based on given information with an accuracy of within 10 percent of instructor's predetermined estimate, specifying correct type and size of masonry units according to given specifications.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Identify typical joint spacing as 3/8 inch (index finger).
- Use averages/estimates above or given by instructor.
- Identify masonry unit.

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.02 LAY A ROWLOCK* COURSE

PERFORMANCE OBJECTIVE:

Given the necessary tools, equipment, and materials, brick and mortar; lay a rowlock* course. The course must be straight and level with no holes or cracks and the joints must be smooth and full joints.

*May substitute: Stretcher, Header, Soldier, Shiner, or Sailor.

PERFORMANCE ACTIONS:

5.0201 Scale course to determine number of bricks required for course.

5.0202 Apply mortar to edges of brick to be laid.

5.0203 Place brick following proper procedure.** (See Related Technical Information.)

5.0204 Continue with process until course is complete.

5.0205 Point and joint course.

PERFORMANCE STANDARDS:

- Lay required course meeting instructor's standards.
- Course must be straight and level and joints must be smooth and waterproof.

MINIMUM PERFORMANCE: Lay course in...

1. Rowlock
2. Sailor
3. Shiner
4. Soldier

SUGGESTED INSTRUCTION TIME: 13 Hours

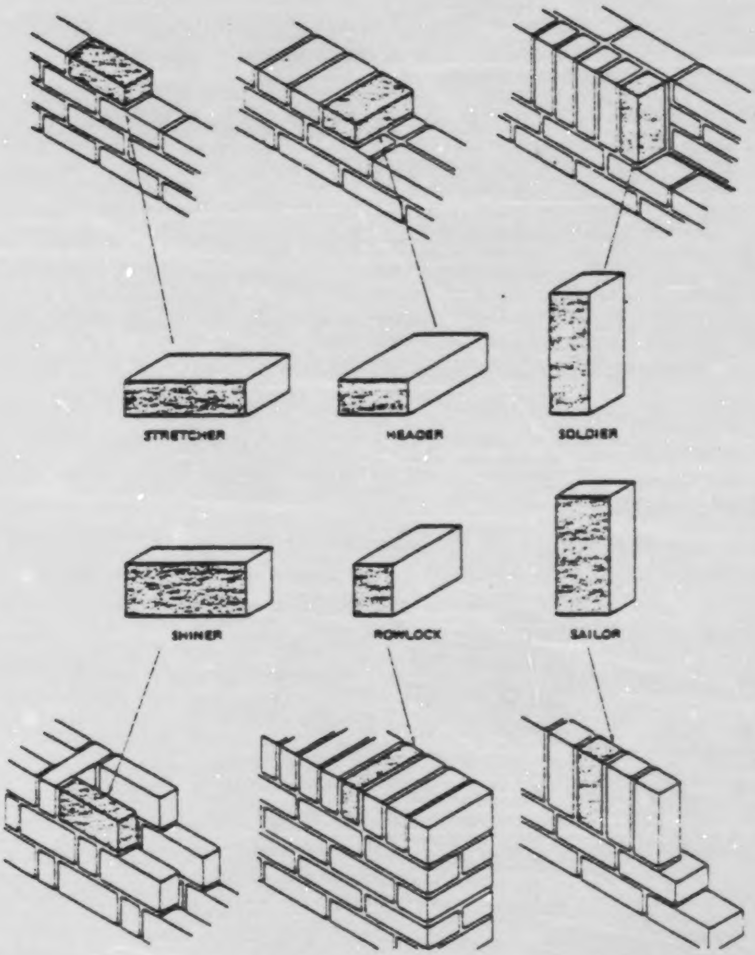
RELATED TECHNICAL INFORMATION:

- **Rowlock: Lay brick on edge with 2 1/4" x 4" facing out.
  Sailor: Lay brick on end with 4" x 8" side facing out.
  Shiner: Lay brick on edge with 4" x 8" side facing out.
  Soldier: Lay brick on end with 2 1/4" x 8" side facing out.
- Identify 6 different positions of brick.

Addendum to Task 5.02

STANDARDS FOR BONDING TERMINOLOGY

Brick positions as they appear in a wall.


STRETCHER
HEADER
SOLDIER
SHINER
ROWLOCK
SAILOR

UNIT 5.0	BASIC BRICKLAYING, JOINTING, AND POINTING
TASK 5.03	IDENTIFY THREE STRUCTURAL BONDS USED IN CONSTRUCTION

PERFORMANCE OBJECTIVE:

Given specific examples of the three structural bonds used in construction; identify designated bonds.

PERFORMANCE ACTIONS:

5.0301	Describe procedure for establishing a building line by using a chalk line.
5.0302	Define dry bonding as used in wall and corner construction.
5.0303	Describe method used for dry bonding a wall for unnecessary cutting.

PERFORMANCE STANDARDS:

- Identify three structural bonds used in construction.

SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Correctly describe three structural bonds used in construction:
  a. Mortar bond
  b. Structural bond
  c. Pattern bond

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.04 DRY BOND A WALL

PERFORMANCE OBJECTIVE:

Given mortar, tools, and bricks; dry bond and interlock masonry units. Embed metal ties in connecting the joints as required.

PERFORMANCE ACTIONS:

5.0401 Layout short 4 inch brick wall stretcher running bond showing half overlap.

5.0402 Lay 14 courses with metal wall ties embedded every 6 courses of brick.

5.0403 Layout 10 inch cavity wall 3 courses high. Pour grout in cavity wall.

PERFORMANCE STANDARDS:

- Dry bond a wall and interlock masonry units.
- Performance process and product must meet instructor's standards.

SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Using finger as index (3/8 inch) guide.
- Spreading mortar with dry bond technique.

UNIT 5.0 — BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.05 — HAND CUT AND POWER SAW BRICK

PERFORMANCE OBJECTIVE:

Given cutting specifications, bricks, a masonry saw, and a brick hammer and set; cut masonry units to +/- 1/8 inch of required size.

PERFORMANCE ACTIONS:

5.0501 Identify methods of cutting brick and masonry units.

5.0502 Demonstrate proper procedures for cutting brick by hand (with hammer and set and with trowel).

5.0503 Demonstrate proper procedures for cutting brick by power saw.

5.0504 Make required masonry cuts using correct procedures.

PERFORMANCE STANDARDS:

- Hand cut and power saw brick (masonry units) using correct procedures and to +/- 1/8 inch of required size.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Safety.
- Identification of hand tools.
- Proper use of hand tools.
- Proper use and care of masonry saw.

UNIT 5.0 — BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.06 — CUT A BAT CLOSURE

PERFORMANCE OBJECTIVE:

Given necessary tools, equipment, and supplies, cut a bat (half brick) closure. Performance process must be acceptable to instructor and product must be cut straight and equal the predetermine size +/- 1/2 inch.

PERFORMANCE ACTIONS:

5.0601	Select proper tools. (Set up masonry saw for operation.)
5.0602	Wear safety protection/clothing.
5.0603	Cut brick (masonry unit) following proper procedures.

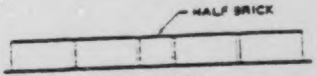
PERFORMANCE STANDARDS:

- Cut a bat closure to +/- 1/2 inch following proper procedures and to instructor's standards.

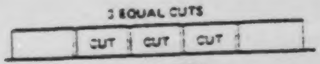
SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Procedures for hand cutting brick:
  a. Hold brick firmly
  b. Score brick on all sides
  c. Strike brick with brick hammer or trowel
  d. Square cut with hammer as necessary
- Safety precautions.
- Proper use and care of masonry saw.
- Method of placing a bat (half brick) in the wall.



(A) PROBLEM



(B) SOLUTION

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.07 LAY A STRETCHER COURSE TO LINE (RUNNING BOND)

PERFORMANCE OBJECTIVE:

Given plans and specifications, brick and mortar, and the necessary equipment, tools, and supplies; lay a stretcher course*. All bricks must be laid level with the line and 1/16 inch or daylight from the line with all head joints within 3/8 to 1/2 inch.

*Running Bond

PERFORMANCE ACTIONS:

5.0701 Dry bond a stretcher course along chalk line.

5.0702 Gage the head joints 3/8 inch.

5.0703 Bed up end bricks on 4-5 or 6 (as instructed), 3 to 8 inches.

5.0704 Level and plumb end bricks.

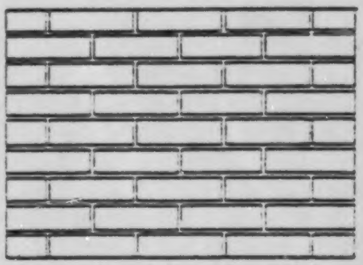
5.0705 Place a line from one end brick to the other.

5.0706 Remove 3 bricks at a time and replace them in mortar.

5.0707 Continue procedure until all bricks are laid in mortar.

PERFORMANCE STANDARDS:

- Lay a stretcher course with all bricks laid plumb, level, with the line and 1/16 inch or daylight from line, with all head joints with 3/8 to 1/2 inch spacing.

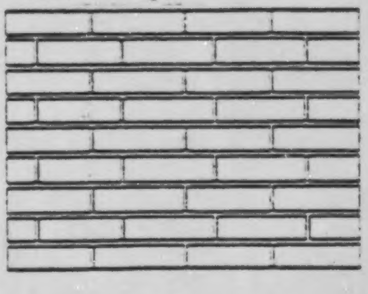


Running bond (all stretcher) with a half lap.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Procedure for laying a stretcher course.
- Use of square, chalk line, mason's line, and modular rule. (Gage actions on instructor's guide.)



Running bond with one-third lap.

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.08 LAY A FULL HEADER COURSE TO LINE (COMMON, AMERICAN)

PERFORMANCE OBJECTIVE:

Given plans and specifications for a common bond wall, brick and mortar; and necessary equipment, tools, and supplies; lay a common (American) bond with full headers. Wall must be laid on a 6 gage or 4 courses to 11 inches with full headers every 6th course. Wall must be level, plumb, straightedged, ranged, jointed, and pointed.

PERFORMANCE ACTIONS:

5.0801 Layout project.

5.0802 Lay first course brick in mortar with veneer bond and on 6 using brick spacing rule.

5.0803 Level and square first course.

5.0804 Cut 4 inch pieces.

5.0805 Bed 6 inch piece on each corner on 6.

5.0806 Lay full headers between 6 inch pieces.

5.0807 Level and plumb header course:

- a. Plumb each jam or corner.
- b. Plumb the face side of each corner.
- c. Straightedge the face and kiln side of wall.

5.0808 Lay 5 courses of the veneer bond.

5.0809 Repeat procedure for consecutive courses.

5.0810 Finish wall as required.

PERFORMANCE STANDARDS:

- Lay a common (American) pattern with full headers /a full header course to line/ with wall laid on 6 gage or 4 courses to 11 inches with full headers every 6th course.
- Wall must be level, plumb, straightedged, ranged, jointed, and pointed, and must meet instructor's standards for process and product.

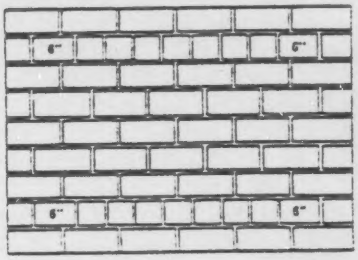
UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.08 LAY A FULL HEADER COURSE TO LINE (COMMON, AMERICAN) (Con't.)

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Masonry rule.
- Use of line pin, line blocks, and horizontal and vertical use of level, twig.
- Preparing head joints.
- Cutting excess mortar.
- Selecting proper cuts for forming a common bond pattern.
- Identify 6 different positions of bricks.
- Identify common bond pattern.
- Safety.



Full header courses every sixth course.

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.09 LAYOUT A STACK BOND WALL

PERFORMANCE OBJECTIVE:

Given plans and specifications for stack bond wall, bricks, mortar, and the necessary tools, equipment, and materials; lay a stack bond wall. The pattern must be uniform, the wall must be plumb, straight, and level, within +/- 1/16 inch of specifications for length, height, and width, and have uniform joints.

PERFORMANCE ACTIONS:

5.0901 Identify stack bond pattern.

5.0902 Scale work for stack bond pattern.

5.0903 Apply mortar to brick.

5.0904 Place brick in position with 4" x 8" side down.

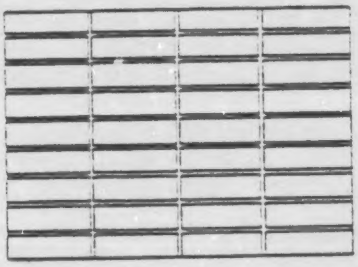
5.0905 Continue procedure until course is complete.

5.0906 Lay succeeding courses until pattern is complete. (Reinforcing pattern according to specifications.)

PERFORMANCE STANDARDS:

- Layout a stack bond wall with a uniform pattern, and that is plumb; straight; and level; within +/- 1/16 inch of specifications for length, height, and width; and that has uniform joints.
- Vertical joint must be aligned with no overlapping of units.
- Process and product must meet instructor's specifications.

SUGGESTED INSTRUCTION TIME: 9 Hours



Stack bond.

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.10 ORIENTATION TO FLEMISH BOND

PERFORMANCE OBJECTIVE:

Given plans and specifications for Flemish bond, bricks and mortar, and the necessary tools, equipment, and materials; lay a Flemish bond wall (for orientation) with Dutch corners. The patterns must be distinctive and uniform, the wall must be plumb, straight, and level, within +/- 1/16 inch of specifications for length, height, and width, with uniform joints.

PERFORMANCE ACTIONS:

5.1001 Identify Flemish bond pattern.

5.1002 Square and mark desired position for pattern.

5.1003 Lay dry bond a full header across the wall on each corner.

5.1004 Lay stretcher next to header within desired pattern position.

5.1005 Alternate full headers and stretchers to opposite end.

5.1006 Fill in stretchers on opposite side of wall.

5.1007 Bed up first course in mortar.

5.1008 Level, straightedge, and check for squareness.

5.1009 Cut four 6 inch pieces.

5.1010 Lay 6 inch pieces in mortar on each corner.

5.1011 Lay stretcher next to header and alternate to opposite end.

5.1012 Level, plumb, straightedge, range, and tool work.

5.1013 Repeat process to obtain desired dimensions.

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.10 ORIENTATION TO FLEMISH BOND (Con't.)

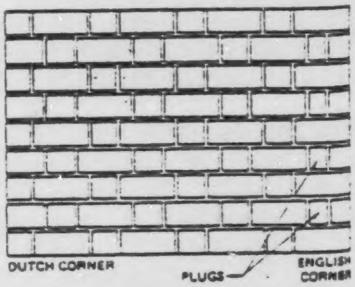
PERFORMANCE STANDARDS:

- (Orientation training) Lay a Flemish bond wall pattern using Dutch corners, with uniform pattern, plumb, straight, and level, within +/- 1/16 inch of specifications for length, height, and width, and with uniform joints.
- Process and product must meet instructor's standards.

SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- When to lay Flemish bond.
- How to lay Flemish bond.
- Safety.
- Use of "plug" against corner return brick.



UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.11 ORIENTATION TO ENGLISH BOND

PERFORMANCE OBJECTIVE:

Given plans and specifications for English bond, bricks and mortar, and the necessary tools, equipment, and materials; lay an English bond wall (for orientation). The patterns must be distinctive and uniform, the wall must be plumb, straight, and level, within +/- 1/16 inch of specifications for length, height, and width, with uniform joints.

PERFORMANCE ACTIONS:

5.1101	Identify English bond pattern.
5.1102	Set up for laying English bond.
5.1103	Lay initial course.
5.1104	Plumb and level initial course.
5.1105	Lay proceeding courses.
5.1106	Plumb and level proceeding courses.

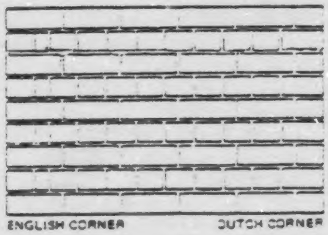
PERFORMANCE STANDARDS:

- (Orientation training) Lay an English bond that has the correct pattern, in uniform, plumb, straight, and level, within +/- 1/16 inch of specifications for length, height, and width, with uniform joints.
- Process and product must meet instructor's standards.

SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Setting up to lay English bond.
- Safety.
- How to keep head joints in true plumb alignment.
- Use of English and Dutch corner.



English bond with English corner (1 inch piece) and Dutch corner (6 inch piece).

TASK 5.12 (Optional) LAY A DIAMOND BOND WALL

PERFORMANCE OBJECTIVE:

Given plans and specifications for a diamond bond wall, bricks, mortar and the necessary tools, equipment and materials; lay an 8 inch diamond pattern wall. The wall must be laid on 6 or 4 to 11 with closers occurring every 4th course when opening the diamond and stretchers occurring every 4th course when closing the diamond. The pattern must be uniform, the wall must be plumb, level, straightedged, ranged, jointed, and free of cracks and holes, within +/- 1/16 inch of specifications for length, height, and width.

PERFORMANCE ACTIONS:

5.1201 Layout bond dry.

5.1202 Lay first course of brick with flemish bond on 6 using spacing rule.

5.1203 Level and square the first course.

5.1204 Cut four 6 inch pieces.

5.1205 Lay 6 inch pieces on each corner on 6's.

5.1206 Level 6 inch pieces and stretcher course.

5.1207 Plumb each corner and jam.

5.1208 Plumb the face of each corner.

5.1209 Straightedge the face and kiln (back) side of the wall.

5.1210 Lay stretcher course between 6 inch pieces.

5.1211 Level and repeat steps 6, 7, and 8.

5.1212 Lay a header on each corner of the third course on 6.

5.1213 Lay 4 stretchers and center 1 header between the 4 stretchers.

5.1214 Repeat step 11.

5.1215 Cut 3 closers and lay them on each end of 4th course.

TASK 5.12 (Optional) LAY A DIAMOND BOND WALL

PERFORMANCE ACTIONS (Con't.):

5.1216 Lay stretcher course between closers.

5.1217 Repeat step 11.

5.1218 Lay 2 whole bricks on each corner of the 4th course.

5.1219 Lay 1 stretcher and 1 header after the whole bricks.

5.1220 Lay 3 stretcher to finish 5th course.

5.1221 Continue to lay diamond pattern in wall by following steps 2-19.

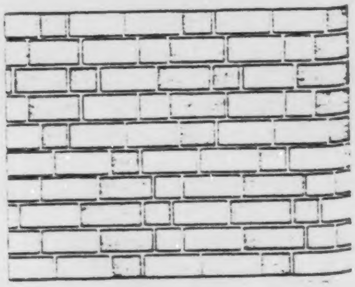
PERFORMANCE STANDARDS:

- Lay a diamond bond wall according to specifications so that the pattern is uniform, the wall plumb, level, straightedged, ranged, jointed, and within +/- 1/16 inch of specifications for length, height, and width.
- Process and product must meet instructor's standards.

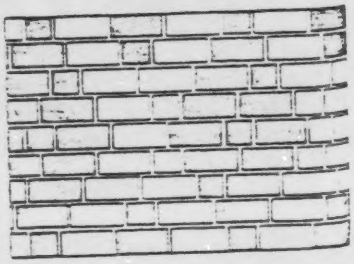
SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Identify diamond bond pattern.
- Identify building code specifications for masonry bonded brick walls.
- Choose proper cuts for forming diamond pattern.
- Safety.



Double stretcher garden wall bond, units in diagonal lines.



Three stretcher garden wall bond, brick in dovetail fashion.

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.13 LAY A BRICK CORNER

PERFORMANCE OBJECTIVE:

Given plans and specifications for a brick wall, mortar, and the necessary tools and materials; lay a brick corner. The corners must be square, level, plumb, and straightedge, with +/- 1/16 inch of specifications for height and width, have uniform courses, and laid on the specified scale.

PERFORMANCE ACTIONS:

5.1301	Identify and use framing square (or plum down batter board lines).
5.1302	Mark square line on floor.
5.1303	Dry bond.
5.1304	Position materials.
5.1305	Temper mortar.
5.1306	Lay initial course.
5.1307	Joint corner.
5.1308	Check for plumb and square.
5.1309	Check for correct height.
5.1310	Tail out lead.

PERFORMANCE STANDARDS:

- Lay a brick corner that is square, level, plumb, and straightedge, within +/- 1/16 inch of specifications for height and width, has uniform courses, and is laid on specified scale.

SUGGESTED INSTRUCTION TIME: 24 Hours

RELATED TECHNICAL INFORMATION:

- Identify and describe tools for laying a corner.
- Distinguish between common and Flemish bond patterns.
- Selecting proper scale for specified height and length.
- Procedure for squaring corners.
- Define "rack" or "rack-back lead" as used in corner construction.
- Straightedging a rack of a corner (tailout lead).
- Safety precautions.

UNIT 5.0 — BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.14 A — ORIENTATION TO BUILDING A DUTCH CORNER

PERFORMANCE OBJECTIVE:

Given instruction, specifications, tools, equipment, and materials, brick and mortar; build a Dutch corner which is square and plumb, meeting instructor's standards.

PERFORMANCE ACTIONS:

5.1401 Set up to build a Dutch corner.

5.1402 Layout initial course.

5.1403 Build Dutch corner to specifications following instructor's recommended techniques.

5.1404 Check corner for square and plumb.

PERFORMANCE STANDARDS:

- Build a Dutch corner which is square and plumb meeting instructor's standards.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Identify Dutch corner.
- Framing square.
- Level.

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.14 B ORIENTATION TO BUILDING AN ENGLISH CORNER

PERFORMANCE OBJECTIVE:

Given tools and materials, brick and mortar, and instructions; build a return corner in English bond. Product must be accurate, square, and plumb.

PERFORMANCE ACTIONS:

5.1401 Set up building an English corner.

5.1402 Layout initial course, plumb and level.

5.1403 Construct English corner following procedures taught.

5.1404 Plumb and level.

PERFORMANCE STANDARDS:

- Build an English return corner that is accurate, square, and plumb, meeting the instructor's standards for performance process and product.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Identify English corner.
- Framing square.
- Level.

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.15 TOOL CONCAVE JOINTS

PERFORMANCE OBJECTIVE:

Given necessary equipment, tools, and supplies, instruction and specifications, and masonry work to tool; tool concave joints. All joints must be uniformly concave and smooth with no double imprints.

PERFORMANCE ACTIONS:

5.1501 Select concave jointer.

5.1502 Test mortar.

5.1503 Strike head joints from bottom of wall up with head jointer (short concave).

5.1504 Strike bed joints from bottom of wall up with sled runner by pushing along the wall with curved portion up front.

5.1505 Fill and finish cracks or holes in joints.

5.1506 Brush, rejoint, and clean all joints.

PERFORMANCE STANDARDS:

- Tool concave joints so that they are uniformly concave and smooth with no double imprints.
- Performance process and product must be to instructor's standards.

SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Correct procedure in tooling concave joints.
- Safety.
- Purpose of tooling mortar joints.
- Major types of jointers commonly used:
    a. Concave/convex jointer
    b. V-jointer
    c. Raked-out jointer
    d. Slicker
- Proper finishing of joints.

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.16 TOOL RAKE JOINTS

PERFORMANCE OBJECTIVE:

Given masonry tools, equipment, and supplies, instruction and specifications, masonry work to tool; tool rake joints so they are uniformly raked, smooth, clean, free of holes and to the depth stated in the specifications.

PERFORMANCE ACTIONS:

5.1601 Select rake jointer.

5.1602 Adjust rake jointer to specified depth.

5.1603 Test mortar.

5.1604 Strike head joints from bottom of wall up with rake jointer.

5.1605 Strike bed joints from bottom of the wall up with rake jointer.

5.1606 Brush, rejoint, and clean all joints.

PERFORMANCE STANDARDS:

- Tool rake joints so they are uniformly raked, smooth, clean, free of holes, and to the depth stated in the specifications.

SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Rake out jointer or skate wheel rake.
- Field expedient rake made from nail and wood.
- Safety.

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.17 TOOL V-JOINTS

PERFORMANCE OBJECTIVE:

Given necessary equipment, tools, and supplies, instruction and specifications, jointer; tool V-joints. All joints must be uniformly V-tooled and smooth with no double imprints.

PERFORMANCE ACTIONS:

5.1701 Select V-jointer to be used.

5.1702 Test mortar.

5.1703 Strike head jointer from bottom of the wall up with short V-jointer.

5.1704 Strike bed joints from bottom of wall up with long V-jointer by pushing along the wall with curved portion up front.

5.1705 Fill and finish joints so no cracks or holes remain.

5.1706 Remove excess mortar.

PERFORMANCE STANDARDS:

- Tool V-joints as required with all joints uniformly V-tooled and smooth with no double imprints.
- Performance process and product must meet instructor's standards.

SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Correct procedure in tooling V-joints.
- Safety.

TASK 5.18 TOOL CONVEX JOINTS

PERFORMANCE OBJECTIVE:

Given masonry equipment, tools, supplies, and specifications; tool convex joints. All joints must be uniformly convex and smooth with no double imprints.

PERFORMANCE ACTIONS:

5.1801 Select jointer.

5.1802 Test mortar to determine if it is ready to be jointed.

5.1803 Strike head joints from the bottom of the wall up, using convex hand jointer.

5.1804 Strike bed joints from bottom of wall up with convex sled runner by pushing along the wall with curved portion up front.

5.1805 All joints must be free of holes or cracks after tooling.

5.1806 Brush, rejoint, and clean all joints.

PERFORMANCE STANDARDS:

- Tool convex joints so that they are uniformly convex and smooth with no double imprints.
- Performance process and product must meet instructor's standards.

SUGGESTED INSTRUCTION TIME: 2 Hours

RELATED TECHNICAL INFORMATION:

- Correct procedure for tooling convex joints.

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.19 ORIENTATION TO FLUSH FINISH JOINTS

PERFORMANCE OBJECTIVE:

Given instruction, equipment, tools, materials, and masonry to finish; flush finish joints for orientation. Meet instructor's standards for performance and product.

PERFORMANCE ACTIONS:

5.1901 Select proper tool(s).

5.1902 Finish masonry joints leaving a flush finish.

5.1903 Clean masonry work.

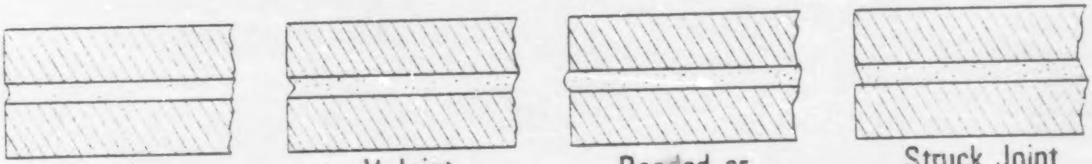
PERFORMANCE STANDARDS:

- (Orientation) Flush finish joints to instructor's standards.

SUGGESTED INSTRUCTION TIME: 1 Hour

ILLUSTRATION OF PREVIOUS FINISHING TASKS:

Types of Tooling

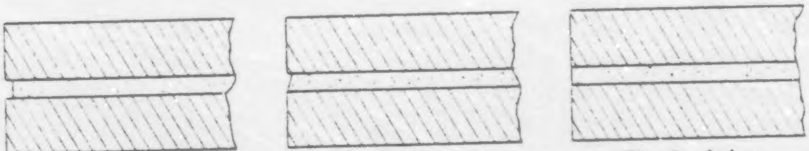


Round or Concave Joint

V-Joint

Beaded or Convex Joint

Struck Joint



Raked Joint

Weather Joint

Flush Joint

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.20 CONSTRUCT A 4 INCH RACK-BACK LEAD IN RUNNING BOND[1]

PERFORMANCE OBJECTIVE:

Given instruction, specifications, equipment, tools, and materials, bricks and mortar; layout and build a 4 inch brick rack-back lead in the running bond. Demonstrate the proper skills in leveling, plumbing, and building to a specified height.

PERFORMANCE ACTIONS:

5.2001 Mix mortar and place on mortar boards located about 2 feet from work area.

5.2002 Layout lead with chalk line on shop floor.

5.2003 Spread enough mortar for the bricks.

5.2004 Lay the first course according to plan.

5.2005 Check height of first brick laid, using modular or spacing rule.

5.2006 Level and plumb the course using first brick as guide.

5.2007 Racking back one half brick on each end of the succeeding courses, continue laying the lead until the specified height (16 inches of 6 courses, unless specified) is reached. Check each course with rule. Level, plumb, and align the tail end of the lead.

5.2008 Strike joints with a jointer as needed. Brush wall at completion of job.

5.2009 Recheck project with plumb rule before it is presented to instructor for evaluation.

PERFORMANCE STANDARDS:

- Construct a 4 inch rack-back lead in the running bond demonstrating the proper skills in leveling, plumbing, and building to a specified height. The finished masonry work must be jointed properly and meet the instructor's standards.
- Emphasis will be on proper techniques and speed.

TASK 5.20 CONSTRUCT A 4 INCH RACK-BACK LEAD IN RUNNING BOND[1] (Con't.)

SUGGESTED INSTRUCTION TIME: 12 Hours

RELATED TECHNICAL INFORMATION:

- If using 2" x 4", lay the 2" x 4" on 3-8", 4" blocks.

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[1] Task adopted from: Kreh, R. T., Sr., Masonry Skills, Albany, NY: Delmar Publishers Inc., pp. 126-127, 1982.

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.21 CONSTRUCT AN OUTSIDE AND INSIDE BRICK CORNER FOR A 4 INCH WALL IN RUNNING BOND[1]

PERFORMANCE OBJECTIVE:

Given instruction, specifications, equipment, tools, and materials, brick and mortar; layout and build an outside and inside corner 9 courses high in the running bond. Build the outside corner first and the inside corner second.

PERFORMANCE ACTIONS:

5.2101 Stack bricks and place mortar on mortar board located about 2 feet from work area.

5.2102 Layout corner on shop floor using steel square and pencil. Extend line a little longer than actual corner will measure.

5.2103 Layout first course dry keeping head joints uniform (3/8").

5.2104 Lay first and second brick in mortar without moving the bricks in between. Level and plumb the first and second brick and straighten the edge each corner.

5.2105 Lay the corner (first) brick first in each succeeding course and work hard the end of the lead level, plumb, and straighten the edge of each course.

5.2106 Check outermost corner of every course laid with the number 6 on the modular rule.

5.2107 Build the corner 9 courses high. It should measure approximately 2 feet high.

5.2108 At the completion, check the tail of the lead on each side with the plumb rule.

5.2109 Strike the corner with a convex sled runner striker, brushing after striking.

5.2110 Parge the back of the corner with mortar so the parging is 3/8 inch thick. Remove excess mortar from corner after parging.

5.2111 Recheck corner with a plumb rule before it is inspected.

TASK 5.21 CONSTRUCT AN OUTSIDE AND INSIDE BRICK CORNER FOR A 4 INCH WALL IN RUNNING BOND[1]

PERFORMANCE ACTIONS (Con't.):

(NOTE: Same performance actions apply to outside and inside brick corner tasks.)

PERFORMANCE STANDARDS:

- Construct an outside (task 1) and inside (task 2) brick corner for a 4 inch wall in running bond, 9 courses high.
- Parge back according to specifications.
- Work should be plumb, straight and completed to the standards of the instructor for procedure and product.
- Emphasis will be on proper techniques and speed.

SUGGESTED INSTRUCTION TIME: 12 Hours

RELATED TECHNICAL INFORMATION:

- Dry bond corner.
- Rack-back lead.
- Tailing a rack-back lead.
- Parging the corner, back-parging.
- Toothing (temporary end).

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[1] Task adopted from: Kreh, R. T., Sr. Masonry Skills, Albany, NY: Delmar Publishers Inc., pp. 128-129, 1982.

UNIT 5.0 — BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.22 — LAY BRICK CORNER AND BUILD A WALL IN RUNNING BOND WITH LINE[1]

PERFORMANCE OBJECTIVE:

Given instruction, specifications for job, equipment, tools, materials, brick and mortar; build brick leads and a 4 inch wall in the running bond, maintaining a uniform thickness of all head and bed joints. Construction of corners and laying bricks to line must be accomplished to the instructor's standards for process and product.

PERFORMANCE ACTIONS:

5.2201 Assemble bricks in work area.

5.2202 Mix mortar and place mortar on mortar boards within about 2 feet of work area.

5.2203 Snap a chalk line longer than 8 feet on shop floor.

5.2204 Make a line for an 8 inch jamb at one end of chalk line with a 2 foot square.

5.2205 Dry bond 10 bricks from the point which was squared off to the other end of the line. (Line slightly longer than necessary to be used as a reference point when laying out the bricks. Space by forefinger, 3/8 inch.).

5.2206 Place mark at end of tenth brick. Use square to square off this point for the jamb on the other side of the wall.

5.2207 Use a brick of average length as a gauge when laying out the jamb of the lead at each end.

5.2208 Bed the corner bricks at each end of the wall to the correct height (number 6 on modular rule). Level the two bricks with each other by setting brick temporarily in the middle as a checkpoint. Other methods may be substituted for level. Be sure that the bricks are plumb, aligned, and ranged with the layout line.

5.2209 Attach the line by pushing a nail to which the line is attached under the end of the brick on the left of the wall. Pull the line up over

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PERFORMANCE ACTIONS (Con't.):

the top of the brick and push the line to the face of the brick. Lay a couple of bricks at the right end of the wall. Pull the line tight and wrap it around the pin. Lay a couple of bricks on top of the line to prevent it from dislodging.

5.2210 Pick up dry bonded bricks as needed and place them in mortar to lay the first course.

5.2211 Cut bats for jambs with the hammer and lay one at each end. Level, plumb, and square the bats with the wall line.

5.2212 Build a lead projecting 3 1/2 bricks at the end of each wall. Check the height of each course with the number 6 on the modular rule. Cut bats as they are needed for jambs. Check jambs periodically to be sure they remain square, plumb, and level.

5.2213 Fill in space between leads, using line as a guide.

5.2214 Resume building leads up to the specified 12 courses in height and fill in the wall to the line. Check work for correct height (number 6 on modular rule).

5.2215 Strike wall with V-joint sled runner striking tool. Brush brickwork.

5.2216 Parge back of wall and inside of jambs with mortar.

5.2217 Recheck project with plumb rule before evaluation by instructor.

PERFORMANCE STANDARDS:

- Lay brick corner and build a wall in running bond with line, maintaining a uniform thickness of all head and bed joints.

TASK 5.22 LAY BRICK CORNER AND BUILD A WALL IN RUNNING BOND WITH LINE[1]

PERFORMANCE STANDARDS (Con't.):

- Construction of corners and laying bricks to line must be accomplished to instructor's standards for process and product.
- Emphasis will be on proper techniques, speed, and quality of finished product.

SUGGESTED INSTRUCTION TIME: 24 Hours

RELATED TECHNICAL INFORMATION:

- Forming solid head joints.
- Removing excess mortar.
- Course alignment.
- Setting lead and first course (ranging to line).

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[1] Task adopted from: Kreh, R. T., Sr., Masonry Skills, Albany, NY: Delmar Publishers Inc., pp. 130-132, 1982.

UNIT 5.0 BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.23 (Optional) ORIENTATION* TO WATERPROOF A BRICK WALL

PERFORMANCE OBJECTIVE: (Orientation*)

Given a brick wall requiring waterproofing and access to necessary tools, equipment, and materials; waterproof the brick wall. The correct waterproofing material and techniques must be selected and applied according to specifications and the walls must be completely sealed.

PERFORMANCE ACTIONS:

5.2301	Identify types of waterproofing materials and their applications.
5.2302	Determine selection procedures for materials when waterproofing masonry walls.
5.2303	Describe techniques for preparing a surface for waterproofing.
5.2304	Describe techniques for applying waterproofing material.
5.2305	Explain the relevant safety precautions/ procedures.

PERFORMANCE STANDARDS:

- *Orientation task.
- Describe/demonstrate proper selection of materials and use techniques for waterproofing given brick wall to specifications and instructor's standards.

SUGGESTED INSTRUCTION TIME: 1 Hour

UNIT 5.0 — BASIC BRICKLAYING, JOINTING, AND POINTING

TASK 5.24 — CLEAN BRICK WALLS

PERFORMANCE OBJECTIVE:

Given cleaning product recommended, brushes, plastic pail, water hose, water supply and cleaning information; mix product and clean brick according to manufacturer's specifications.

PERFORMANCE ACTIONS:

5.2401	Identify cleaning product.
5.2402	Discuss safety precautions.
5.2403	Clean brick using proper procedures.

PERFORMANCE STANDARDS:

- Mix appropriate product and clean brick according to manufacturer's specifications.
- Instructor's standards apply.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

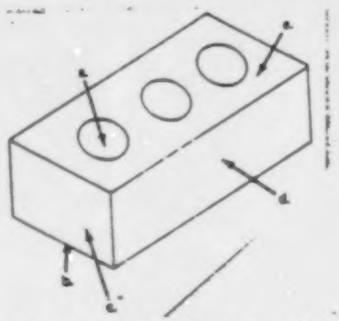
- Safety.

Unit 5.0

STUDENT: ______________________________ DATE: __________

1. Identify the parts of a brick by labeling the diagram below.

   a. __________
   b. __________
   c. __________
   d. __________
   e. __________



Calculate the problems below and select the most correct answer to each statement and mark your answer in the space provided.

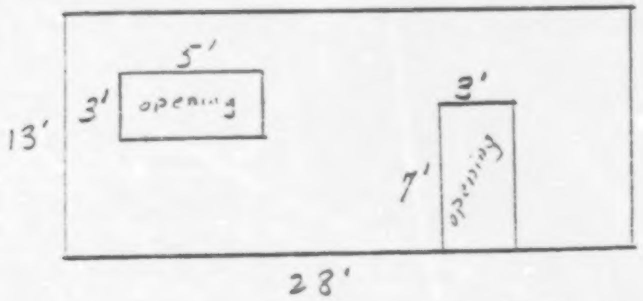
2. Find the number of bricks needed for each wall (using 7 bricks per sq. ft.).

a. Side one: 12' x 24'	a. __________
b. Side two: 12' x 18'	b. __________
c. Side three: 12' x 12'	c. __________
d. Side four 7' x 18'	d. __________

3. Find the number of bricks needed for the following walls (using 7 bricks per sq. ft.).

a. Wall = 12' x 18' with 3' x 7' door.	a. __________
b. Wall = 12' x 24' with two openings, one 4' x 6' and 8' x 6'.	b. __________

4. Given the following wall dimensions, calculate the area to be bricked. Select the closest answer.



West Wall

Choices

a. 318 sq. ft.
b. 328 sq. ft.
c. 338 sq. ft.

5. Estimate the materials needed to construct a wall that is 50' feet long and 41 feet high. For calculations, use 7 bricks per sq. ft.; use 8 bags of masonry cement per 1,000 bricks; and use 1 ton of sand per 1,000 bricks estimating the sand to the nearest 1/2 ton over the amount calculated. Estimate the individual materials for the job (bricks, cement, and sand) and total the estimates.

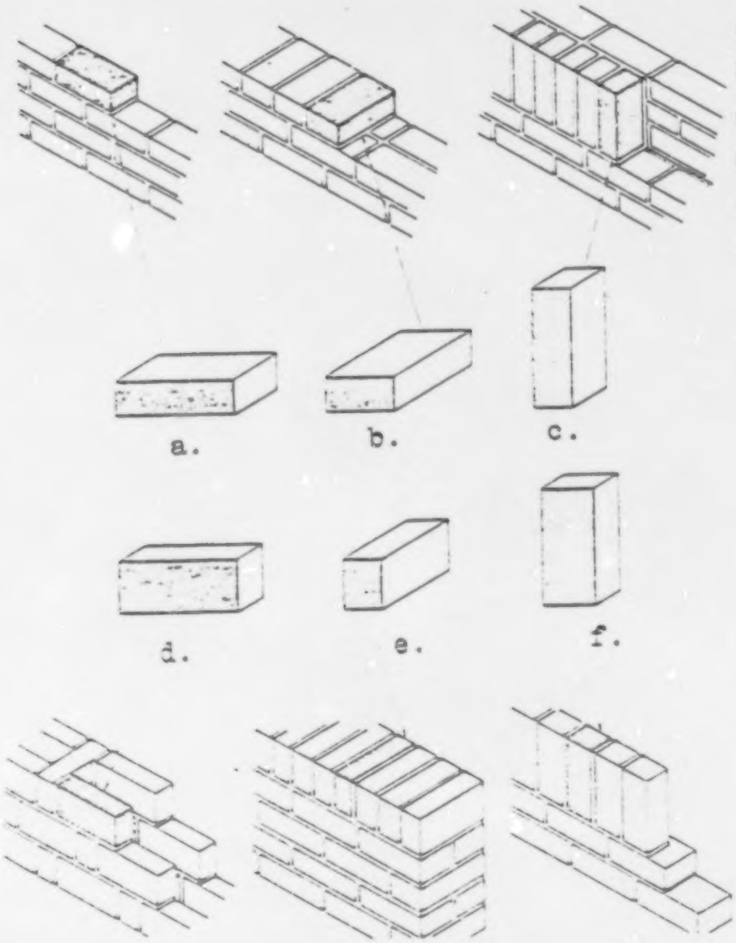
Show calculations here: Answers:

Bricks a. ____________________

Cement b. ____________________

Sand c. ____________________

6. The below diagram represents brick positions as they appear in different bonds in a wall. Identify the bonds by correct terminology. Write your answers on the answer blanks to the right.



Answers:

a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

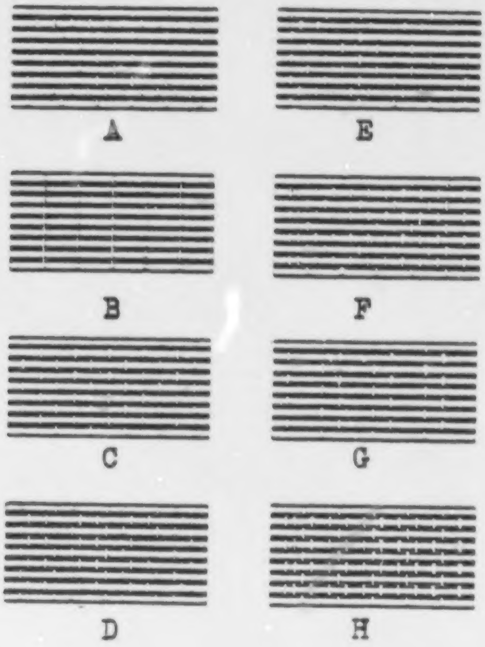
f. ____________________

7. Several brick bond patterns are illustrated below. Select the correct name for each bond from the list at the right and indicate your answer at the left.

A. ______________
B. ______________
C. ______________
D. ______________
E. ______________
F. ______________
G. ______________
H. ______________

a. Stack
b. Running
c. English
d. 1/3 Running
e. Common or Full Header
f. Common or Flemish Header
g. English Cross or Dutch
h. Flemish
i. Diamond
j. Basket weave on Edge

Types of Bonds



STUDENT: ______________________ DATE: ____________

PERFORMANCE TESTS:

1. Given bricks and assignment to bond a wall, demonstrate proper method of dry bonding using finger as index (3/8 in.) guide. Performance must be to the instructor's standards.

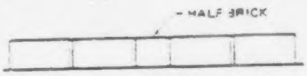
2. Hand cut given brick to specifications +/- 1/8 inch using the hammer and set. Performance process and product must be to the instructor's standards and will be rated as acceptable or not acceptable.

3. Demonstrating proper use of power saw, cut a masonry unit to specifications +/- 1/8 inch using the power saw. Performance process and product must be acceptable to the instructor and will be rated as acceptable or not acceptable.

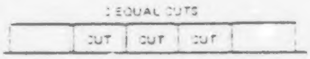
4. Given a problem situation pictured below, describe and demonstrate how to cut a bat closure to solve the problem. Solution must agree with predetermined solution and performance must be acceptable to instructor.

Instructor's rating:

( ) Acceptable
( ) Not acceptable



PROBLEM



SOLUTION

5. Lay a stretcher course to line (running bond) so all bricks are laid plumb, level, with the line and 1/16 inch or daylight from line, with all head joints with 3/8 to 1/2 inch spacing. Proper use must be made of square, chalk line, mason's line, and modular rule. Minimum competency should be 90 percent on rating scale.

RATING SCALE FOR BONDING A WALL

		Rating
Safety	10	______
Workmanship	10	______
Level	15	______
Plumb	15	______
Straight	15	______
To line	15	______
Knowledge of assignment	10	______
Attitude toward assignment	10	______

TOTAL POSSIBLE (100 pts.)

INSTRUCTOR'S RATING = ______

6. Layout a stack bond wall with a uniform pattern, and that is plumb; straight; and level; within +/- 1/16 inch of specifications for length, height, and width; and that has uniform joints. Vertical joints must be aligned with no overlapping units and process and product performance must meet instructor's standards.

RATING SCALE FOR BONDING A WALL

		Rating
Safety	10	______
Workmanship	10	______
Level	15	______
Plumb	15	______
Straight	15	______
To line	15	______
Knowledge of assignment	10	______
Attitude toward assignment	10	______

TOTAL POSSIBLE (100 pts.)

INSTRUCTOR'S RATING = ______

7. Given plans and specifications and all materials needed; lay a brick corner that is square, level, plumb, and straightedge, within +/- 1/16 inch of specifications for height and width, has uniform courses, and is laid on specified scale. Performance process and product must meet instructor's standards.

CHECKLIST FOR PERFORMANCE EVALUATION

	Acceptable	Not Acceptable
1. Safety.	____	____
2. Planning.	____	____
3. Layout.	____	____
4. Spreading mortar.	____	____
5. Level.	____	____
6. Plumb.	____	____
7. Straight.	____	____
8. To line.	____	____
9. Workmanship.	____	____
10. Tools properly used.	____	____
11. Tools cleaned and stored.	____	____
12. Completeness of job.	____	____
13. Cleaned up work area.	____	____
14. Knowledgeable about assignment.	____	____
15. Attitude toward assignment.	____	____

8. Given necessary equipment, tools, supplies, and specifications, and masonry work to tool; tool joints as required by instructor.

A	N	Type Joint Tooled	Minimum Performance Standards
( )	( )	Concave	Uniformly concave and smooth with no double imprint.
( )	( )	Rake	Uniformly raked, smooth, clean, free of holes, and to depth stated in specifications.
( )	( )	V-Joints	Uniformly V-tooled and smooth with no double imprint.
( )	( )	Convex	Uniformly convex and smooth with no double imprints.
( )	( )	Flush	Uniformly flush finished.

A = Acceptable
N = Not Acceptable

9. Given specifications, equipment, tools, and all materials needed, layout and build a 4 inch brick rack-back lead in the running bond and demonstrate proper skills in leveling, plumbing, and building to a specified height. Both performance process and product must meet instructor's standards. Emphasis will be on proper techniques and speed.

SUGGESTED PERFORMANCE EVALUATION AREAS

A	N		
( )	( )	1.	Safety.
( )	( )	2.	Planning.
( )	( )	3.	Layout.
( )	( )	4.	Spreading mortar.
( )	( )	5.	Level.
( )	( )	6.	Plumb.
( )	( )	7.	Straight.
( )	( )	8.	To line.
( )	( )	9.	Workmanship.
( )	( )	10.	Use of tools.
( )	( )	11.	Cleaned and stored tools.
( )	( )	12.	Completeness of job.
( )	( )	13.	Cleaned up work area.
( )	( )	14.	Knowledge of assignment.
( )	( )	15.	Attitude toward assignment.

10. Given specifications, equipment, tools, and all materials needed, layout and build an outside and inside corner 9 courses high in the running bond. Build the outside corner first and the inside corner second. Parge back according to specifications. Work should be plumb, straight, and completed to the standards of the instructor for procedure and product. Emphasis will be on proper techniques and speed.

SUGGESTED PERFORMANCE EVALUATION AREAS

A	N		
( )	( )	1.	Safety.
( )	( )	2.	Planning.
( )	( )	3.	Layout.
( )	( )	4.	Spreading mortar.
( )	( )	5.	Level.
( )	( )	6.	Plumb.
( )	( )	7.	Straight.
( )	( )	8.	To line.
( )	( )	9.	Workmanship.
( )	( )	10.	Use of tools.
( )	( )	11.	Cleaned and stored tools.
( )	( )	12.	Completeness of job.
( )	( )	13.	Cleaned up work area.
( )	( )	14.	Knowledge of assignment.
( )	( )	15.	Attitude toward assignment.

11. Given specifications for job, equipment, tools, and all materials needed, build brick leads and a 4 inch wall in the running bond, maintaining a uniform thickness of all head and bed joints. Construction of corners and laying bricks to line must be accomplished to the instructor's standards for process and product. Parge back of wall and inside of jambs with mortar. Strike wall with V-joint sled runner. Brush brickwork. Build to 12 courses high. Bats must be properly cut and used.

SUGGESTED CHECKLIST FOR PERFORMANCE EVALUATION

A	N	
( )	( )	1. Safety.
( )	( )	2. Planning.
( )	( )	3. Layout.
( )	( )	4. Spreading mortar.
( )	( )	5. Level.
( )	( )	6. Straight.
( )	( )	7. Plumb.
( )	( )	8. To line.
( )	( )	9. Workmanship.
( )	( )	10. Use of tools.
( )	( )	11. Cleaned and stored tools.
( )	( )	12. Completeness of job.
( )	( )	13. Cleaned up work area.
( )	( )	14. Knowledge of assignment.
( )	( )	15. Attitude toward assignment.

A = Acceptable
N = Not acceptable

UNIT 6.0

BASIC BLOCKLAYING, JOINTING, AND POINTING

Preliminary skills to this unit include:

- Masonry tools and equipment
- Safety
- Hand cut and saw masonry units
- Mortar

MASONRY
BASIC BLOCKLAYING, JOINTING, AND POINTING
SUGGESTED INSTRUCTION TIMES

MASONRY UNIT/TASK		SUGGESTED HOURS
Unit 6.0	BASIC BLOCKLAYING, JOINTING, AND POINTING	
6.01	Estimate Concrete Masonry Units	18
6.02	Spread Mortar	24
6.03	Bond a Block Wall	18
6.04	Lay a Stretcher Course to Line in Concrete Block	12
6.05	Tool Block Joints	3
6.06	Build Concrete Block Corner	24
6.07	Raise a Concrete Block Foundation Wall	36
6.08	(OPTIONAL) Orientation to Waterproof a Masonry Wall	3
6.09	Clean Block Wall	6
6.10	Lay Vertical Bond Pattern (Stack Bond) Concrete Block Wall	24
	TOTAL HOURS	168
Grand Total First Year		540

TASK LISTINGS
MASONRY

UNIT/TASK	DESCRIPTION
Unit 6.0	BASIC BLOCKLAYING, JOINTING, AND POINTING
6.01	(Estimate Concrete Masonry Units) Given the length and height of various walls; estimate the number of masonry units required to construct the desired walls using rule of thumb method. Estimates should be with 10 percent of a predetermined estimate made by the instructor. Mortar and sand should be included in estimate.
6.02	(Spread Mortar) Given trowel, mortar, blocks, and all necessary tools, equipment, and materials; spread mortar on concrete blocks. Mortar must be spread evenly at least 24 inches in one spread.
6.03	(Bond a Block Wall) Given specified dimensions for a wall, block, and the necessary tools, equipment and materials; bond a block wall. Joint spacing must be uniform, blocks must be within +/- 1/16 inch of specified dimensions, and necessary cuts be placed at the corners.
6.04	(Lay a Stretcher Course to Line in Concrete Block) Given specifications, blocks, mortar, and necessary tools, equipment, and materials; lay a stretcher course (running bond pattern) to the line. The wall must be straight, level, plumb, with equalized joints vertically and horizontally and alternating vertical joints plumb.
6.05	(Tool Block Joints) Given a block wall with unfinished joints and the necessary finishing tools, equipment, and materials; tool joints. All joints must be uniformly jointed and smooth with no double imprint.
6.06	(Build Concrete Block Corner) Given plans and specifications for block corner (wall with corner, etc.), block, mortar, and the necessary tools, equipment, and materials; build a block corner 7 courses high in the running bond. Corners must be square, level, plumb, and straightedged, within +/- 1/16 inch of specifications for height and width, have uniform courses, and laid on the specified scale.
6.07	(Raise a Concrete Block Foundation Wall) Given a prepared area such as the shop floor, block, mortar, and the necessary tools, equipment, and drawing or plan; raise a concrete block foundation wall. The wall will be straight, level, plumb, and to height with +/- 1/8 inch of specifications.

6.08 (Orientation to Waterproof a Masonry Wall) Given a masonry wall requiring waterproofing and the necessary tools, equipment, and materials; waterproof the masonry wall as required. Correct waterproofing materials and techniques must be selected and applied according to specifications and wall must be completely sealed.

6.09 (Clean Block Wall) Given a block wall needing cleaning, the necessary tools, equipment, and materials; clean the block wall to the standards of the instructor. The wall must be free of excess mortar and all cracks and holes in joints must be filled.

6.10 (Lay Vertical Bond Pattern /Stack Bond/ Concrete Block Wall) Given plans and specifications for a stack bond wall (vertical bond pattern), blocks, mortar, and the necessary tools, equipment, and materials; lay a stack bond wall. The pattern must be uniform, wall must be plumb, straight, and level within +/- 1/16 inch of specifications for length, height, and width, and have uniform joints.

UNIT 6.0 BASIC BLOCKLAYING, JOINTING, AND POINTING

TASK 6.01 ESTIMATE CONCRETE MASONRY UNITS

PERFORMANCE OBJECTIVE:

Given the length and height of various walls; estimate the number of masonry units required to construct the desired walls using rule of thumb method. Estimates should be within 10 percent of a predetermined estimate made by the instructor. Mortar and sand should be included in estimate.

PERFORMANCE ACTIONS:

6.0101 Determine size of masonry structure from specifications, prints, or given information.

6.0102 Use block measurements of 8" x 8" x 16".

6.0103 Estimate materials by "Rule of Thumb" (See Unit 20 in Masonry Skills by Kreh):

a. Determine length and width of foundation.
b. Double these figures if there are 2 walls on each side of foundation.
c. Add total length and width together for total lineal feet in foundation.
d. Multiply total lineal feet in foundation by .75 to find the number of concrete blocks to lay 1 course around foundation.
(NOTE: Three concrete blocks lay 4 feet in length in a wall. Ratio of block to length in feet is .75 to 1.)
(If necessary review decimal calculations.)
e. Find number of courses in height of wall:
(NOTE: 1 block = 8 inches)
    (1) Find number of feet in wall height.
    (2) Multiply this height by 12 to convert height to inches.
    (3) Divide height in inches by 8 to determine number of courses high.
f. Multiply the number of blocks per course (step d) by the number of courses (step e-3) to estimate the total number of concrete blocks in the walls.
(NOTE: No deductions have been made for openings at this time. Additional steps are necessary.)

PERFORMANCE ACTIONS (Con't.):

6.0104 Allow for openings in masonry structure. (For each door use a measurement of 32" x 80". For each window use a measurement of 24" x 48".):

a. Add width of doors for total width.
b. Determine number of blocks that must be subtracted by dividing total door width by length of 1 block (16") to determine blocks/course.
c. Determine number of course for door(s) by dividing height of doors by 8 inches.
d. Multiply the totals found in (step b) and (step c) to determine the blocks to subtract for door(s).
e. Repeat steps a-d for windows.

6.0105 Add number of blocks found in (step d) and (step e) to determine total number of blocks to deduct from estimate found in (step 3).

6.0106 Estimate masonry cement using the rule of thumb that 1 each 70 pound bag of masonry cement will lay 30 blocks of regular size:

$$\text{Divide number of blocks } \frac{\text{found in (step 5)}}{30} = \text{Bags of Masonry Cement}$$

(NOTE: Consult chart if Portland cement and lime mixture are used.)

6.0107 Estimate sand required. As a "rule of thumb", allow 1 ton of sand/8 bags of mortar mix. Estimate to the nearest 1/2 ton high:

a. Multiply the number of concrete blocks (30) x the bags of cement per ton (8) to determine the number of cement blocks per ton of sand.

Rule of thumb (for 8 inch blocks)
30 x 8 = 240 blocks per ton of sand.

PERFORMANCE ACTIONS (Con't.):

b. Divide $\frac{\text{total blocks (step 5)}}{\text{number of blocks/ton sand (240)}}$ = tons of sand

c. Add to this estimate 1/2 ton for waste. Total sand to order = 6 1/2 tons.

6.0108 Total materials to order for job.

PERFORMANCE STANDARDS:

- Estimate concrete masonry units, cement, and sand for a given job. The estimate must be within 10 percent of the predetermined estimate made by the instructor.

SUGGESTED INSTRUCTION TIME: 18 Hours

RELATED TECHNICAL INFORMATION:

- Rule of thumb: 5 gals. of water are used for each 70 pounds of cement.
- Typical block measurements (sizes).
- Typical measurements of openings for block structures.

UNIT 6.0 BASIC BLOCKLAYING, JOINTING, AND POINTING

TASK 6.02 SPREAD MORTAR

PERFORMANCE OBJECTIVE:

Given trowel, mortar, blocks, and all necessary tools, equipment, and materials; spread mortar on concrete blocks. Mortar must be spread evenly at least 24 inches in one spread.

PERFORMANCE ACTIONS:

6.0201 Take block from dry bond, one at a time, spreading mortar by bedding outside webs of block (face shell bedding).

6.0202 Demonstrate proper method for selecting and holding the trowel.

6.0203 Demonstrate proper procedure for throwing and spreading mortar.

PERFORMANCE STANDARDS:

- Spread mortar on concrete block evenly for at least 24 inches in one spread.
- Bed outside webs of block (face shell bedding).
- Task emphasis is on procedure or technique and eventually speed.

SUGGESTED INSTRUCTION TIME: 24 Hours

RELATED TECHNICAL INFORMATION:

- Safety.
- Trowel selection, use, and care.
- Applying mortar on web.
- Level and plumbing first course of block.
- Full head joints formed on both ears (end edges) of block.

TASK 6.03 BOND A BLOCK WALL

PERFORMANCE OBJECTIVE:

Given specified dimensions for a wall, block, and the necessary tools, equipment and materials; bond a block wall. Joint spacing must be uniform, blocks must be within +/- 1/16 inch of specified dimensions, and necessary cuts be placed at the corners.

PERFORMANCE ACTIONS:

6.0301 Review procedures for dry bonding brick units.

6.0302 Establish a wall line (chalk line floor).

6.0303 Dry bond the block wall.

PERFORMANCE STANDARDS:

- Dry bond the block wall to specifications, +/- 1/16 inch, with uniform spacing, and necessary cuts to be placed in corners.
- Performance process and product must meet instructor's standards.

SUGGESTED INSTRUCTION TIME: 18 Hours

RELATED TECHNICAL INFORMATION:

- Dry bonding.

UNIT 6.0 BASIC BLOCKLAYING, JOINTING, AND POINTING

TASK 6.04 LAY A STRETCHER COURSE TO LINE IN CONCRETE BLOCK

PERFORMANCE OBJECTIVE:

Given specifications, blocks, mortar, and necessary tools, equipment, and materials; lay a stretcher course (running bond pattern) to the line. The wall must be straight, level, plumb, with equalized joints vertically and horizontally and alternating vertical joints plumb.

PERFORMANCE ACTIONS:

6.0401 Establish point on each end where wall is to be laid.

6.0402 Bond out wall by using 16 inches to constitute one block.

6.0403 Build a short lead on each end (approximately 3 blocks long) using half blocks on every other course for proper overlap and a line for proper alignment.

6.0404 Put up line, using blocks or desired line holder and lay out wall between established leads.

6.0405 Place reinforcement wire on top of wall, horizontally, every 16 inches on center, vertically.

6.0406 Put up line on each course of blocks and continue to lay wall until top of leads are reached.

6.0407 Build additional leads and continue same procedure until height of wall is reached.

PERFORMANCE STANDARDS:

- Lay a stretcher course to line using concrete blocks.
- The wall must be straight, level, plumb, with alternating vertical joints plumb.
- Block laid 1/16 inch from wall line with full head and bed joints of uniform thickness.
- Performance process and product must be to instructor's standards.

UNIT 6.0 BASIC BLOCKLAYING, JOINTING, AND POINTING

TASK 6.04 LAY A STRETCHER COURSE TO LINE IN CONCRETE BLOCK (Con't.)

SUGGESTED INSTRUCTION TIME: 12 Hours

RELATED TECHNICAL INFORMATION:

- Procedure for laying a stretcher course to line.
- Use of mason's line.
- Techniques for making uniform head and bed joints.
- Reinforcing materials used in laying concrete block.
- Safety.

UNIT 6.0 BASIC BLOCKLAYING, JOINTING, AND POINTING

TASK 6.05 TOOL BLOCK JOINTS

PERFORMANCE OBJECTIVE:

Given a block wall with unfinished joints and the necessary finishing tools, equipment, and materials; tool joints. All joints must be uniformly jointed and smooth with no double imprint.

PERFORMANCE ACTIONS:

6.0501 Test mortar joint for readiness (for jointing).

6.0502 Select proper jointer.

6.0503 Demonstrate correct procedure/technique for tooling head and bed joints, applying proper pressure.

6.0504 All mortar to dry.

6.0505 Brush.

PERFORMANCE STANDARDS:

- Tool cement block joints uniformly and smooth with no double imprint.

SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Procedure for testing joints for readiness for jointing.
- Use trowel in cutting off tags of mortar.
- Select joint tools as required: Concave and V-joint tools, and sled runner jointer.
- Safety.

TASK 6.06 BUILD CONCRETE BLOCK CORNER

PERFORMANCE OBJECTIVE:

Given plans and specifications for block corner (wall with corner, etc.), block, mortar, and the necessary tools, equipment, and materials; build a block corner 7 courses high in the running bond. Corners must be square, level, plumb, and straightedged, within +/- 1/16 inch of specifications for height and width, have uniform courses, and laid on the specified scale.

(NOTE: Typically will be combined with task that follows.)

PERFORMANCE ACTIONS:

6.0601 Review specifications and plan.

6.0602 Assemble block, tools, mortar, and materials for job.

6.0603 Clean area where corner is to be built.

6.0604 Square corner with framing square.

6.0605 With plumb rule and chalk box, extend squared line far enough to build corner.

6.0606 Spread solid bed of mortar and lay first block so it is level and plumb.

6.0607 Lay remaining block of first course being sure it is level and plumb and that height measures 8 inches on modular rule.

6.0608 Continue procedure until specified height is reached.

6.0609 Strike corner on both sides with convex sled-runner jointer. Brush work when striking is finished and mortar dried satisfactorily.

6.0610 Recheck end of the lead and the corner for correct height with plumb rule.

TASK 6.06 BUILD CONCRETE BLOCK CORNER (Con't.)

PERFORMANCE STANDARDS:

- Build a block corner 7 courses high in running bond.
- Corners must be square, level, plumb, and straightedged, within +/- 1/16 inch of specifications for height and width, have uniform courses, and laid on specified scale.
- Performance process and product must be in instructor's specifications.

SUGGESTED INSTRUCTION TIME: 24 Hours

RELATED TECHNICAL INFORMATION:

- Tools for laying a corner.
- Scales for proper height and length.
- Procedures for squaring corners.
- How to rack a corner.
- Safety.
- Reinforcing techniques.

UNIT 6.0	BASIC BLOCKLAYING, JOINTING, AND POINTING
TASK 6.07	RAISE A CONCRETE BLOCK FOUNDATION WALL

PERFORMANCE OBJECTIVE:

Given a prepared area such as the shop floor, block, mortar, and the necessary tools, equipment, and drawing or plan; raise a concrete block foundation wall. The wall will be straight, level, plumb, and to height with +/- 1/8 inch of specifications.

(NOTE: Typically will be combined with previous task.)

PERFORMANCE ACTIONS:

6.0701 Review plans/specifications.

6.0702 Assemble block, mortar, tools, and supplies as necessary.

6.0703 Layout first course using rule to check the bond.

6.0704 Set up corner poles on wall line and erect line for first course.

6.0705 Mark corner pole in 8 inch divisions.

6.0706 Cut necessary half blocks as shown on plan (or as required to complete job correctly).

6.0707 Move line as needed and erect wall to a height of 4 feet or 6 courses.

6.0708 Strike mortar joints with convex jointer as required.

6.0709 Brush and recheck wall with plumb rule.

PERFORMANCE STANDARDS:

- Raise a concrete block foundation wall to required height +/- 1/8 inch of specifications.
- Wall must be straight, level, plumb, and constructed following proper techniques.
- Job must be completed to instructor's standards for process and product.

TASK 6.07 RAISE A CONCRETE BLOCK FOUNDATION WALL (Con't.)

SUGGESTED INSTRUCTION TIME: 36 Hours

RELATED TECHNICAL INFORMATION:

- Establishing plumb points on footing.
- Bonding corners.
- Safety.
- Striking joints.
- Spacing to line.
- Proper use of mortar.

UNIT 6.0 BASIC BLOCKLAYING, JOINTING, AND POINTING

TASK 6.08 (Optional) ORIENTATION TO WATERPROOF A MASONRY WALL

PERFORMANCE OBJECTIVE:

Given a masonry wall requiring waterproofing and the necessary tools, equipment, and materials; waterproof the masonry wall as required. Correct waterproofing materials and techniques must be selected and applied according to specifications and wall must be completely sealed.

PERFORMANCE ACTIONS:

6.0801 Identify types of waterproofing materials and applications.

6.0802 Identify typical situations where waterproofing is recommended.

6.0803 Select materials for waterproofing job.

6.0804 Using proper procedures and techniques, prepare surface for waterproofing.

6.0805 Apply waterproofing materials and techniques.

6.0806 Check work.

PERFORMANCE STANDARDS:

- Waterproof given cement wall as required selecting the correct waterproofing materials and techniques according to specifications and situation so that the finished wall will be completely sealed.

SUGGESTED INSTRUCTION TIME: 3 Hours

UNIT 6.0 BASIC BLOCKLAYING, JOINTING, AND POINTING

TASK 6.09 CLEAN BLOCK WALL

PERFORMANCE OBJECTIVE:

Given a block wall needing cleaning, the necessary tools, equipment, and materials; clean the block wall to the standards of the instructor. The wall must be free of excess mortar and all cracks and holes in joints must be filled.

PERFORMANCE ACTIONS:

6.0901 Determine what must be cleaned from the wall.

6.0902 Select proper tools, equipment, or materials for cleaning.

6.0903 Demonstrate proper procedure for rubbing wall down.

6.0904 Demonstrate proper procedure for brushing wall.

PERFORMANCE STANDARDS:

- Given a concrete wall to clean, clean blocks to the instructor's standards so that the wall is free of excess mortar and all cracks and holes or cracks in joints are filled.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Proper use of tools.
- Safety.

UNIT 6.0 BASIC BLOCKLAYING, JOINTING, AND POINTING

TASK 6.10 LAY VERTICAL BOND PATTERN (STACK BOND) CONCRETE BLOCK WALL

PERFORMANCE OBJECTIVE:

Given plans and specifications for a stack bond wall (vertical bond pattern), blocks, mortar, and the necessary tools, equipment, and materials; lay a stack bond wall. The pattern must be uniform, wall must be plumb, straight, and level within +/- 1/16 inch of specifications for length, height, and width, and have uniform joints.

PERFORMANCE ACTIONS:

6.1001 Identify stack bond (vertical bond) pattern.

6.1002 Assemble building materials, tools, and equipment.

6.1003 Establish end points where wall is to be built.

6.1004 Bond out wall, using 16 inches to constitute one block.

6.1005 Build a short lead on each end (about 2 blocks long). Place whole blocks directly over whole blocks, using a line for alignment.

6.1006 Establish line using line blocks or substitutes and lay wall between established leads.

6.1007 Place reinforcement wire on top of wall, horizontally, every 16 inches on center.

6.1008 Put up line in each course of blocks and continue to lay block until top of leads are reached.

6.1009 Build additional leads and continue same procedure until height of wall is reached.

6.1010 Cap top of concrete wall as required.

TASK 6.10 LAY VERTICAL BOND PATTERN (STACK BOND) CONCRETE BLOCK WALL (Con't.)

PERFORMANCE STANDARDS:

- Lay vertical bond pattern (stack bond) concrete block wall with uniform pattern, to within +/- 1/16 inch of specifications for length, height, and width.
- Wall must be plumb, straight, and level.
- Performance process and product must be to instructor's standards.

SUGGESTED INSTRUCTION TIME: 24 Hours

RELATED TECHNICAL INFORMATION:

- Stack bond pattern (vertical pattern).
- Making proper cuts for stack pattern.
- Reinforcement techniques.
- Safety.

Unit 6.0

STUDENT: ________________________________ DATE: ______________

1. For a foundation measuring 40' x 70' and 32" high with 1 door and 2 windows, estimate the number of masonry units required to complete the structure using the "rule of thumb" method. Estimates should be within 10 percent of a predetermined estimate made by the instructor. Mortar and sand should be included in the estimate.

   In estimating block, mortar and sand, use block measurements of 8" x 8" x 16". Use a ratio of block to length of feet of .75 to 1. Allow 32" x 80" for a door and 24" x 48" for a window. Use the rule of thumb that a 70 pound bag of masonry cement will lay 30 blocks. Use the "rule of thumb" that 1 ton of sand is required for 8 bags of cement and calculate sand to the nearest 1/2 ton high. Calculate the water needed based on 5 gallons of water per 70 pounds of cement.

   1. Lineal feet = __________
   2. Blocks for 1 course = __________
   3. Courses for height = __________
   4. Total blocks for foundation = __________
   5. How many blocks were allowed for openings? = __________
   6. Bags of 70 lb. cement = __________
   7. Tons of sand = __________
   8. How many gallons of water will be needed? = __________

   Using current prices for block, cement, and sand given by the instructor, calculate the total cost for the foundation materials.

   Block = $_____
   Sand = $_____
   Cement = $_____
   TOTAL = $_____

MULTIPLE CHOICE

Estimate the following masonry problems and select the correct answer from those given.

1. If it takes 2 bags of mortar per 100 blocks, how many bags will it take to lay 350 blocks?

   ____ a. 6
   b. 7
   c. 8

2. If a mason can lay 8" x 8" x 16" block at a rate of 225 per 8 hour day, how many days will the mason need to lay 4,500 blocks?

____ a. 56.2
b. 22.5
c. 20
d. 16

3. A wall is to be built of concrete block measuring 12" x 3" x 16". How many courses are needed to construct the wall 10' high?

____ a. 7.5
b. 10
c. 15

4. A block is most likely to be cut using the _____?

____ a. trowel
b. plug or mash hammer
c. brick set and hammer

5. The most popular joint for cement block is _____?

____ a. V-joint
b. flush
c. concave

STUDENTS: ______________________________ DATE: ____________

PERFORMANCE TESTS

1. Spread Mortar

Given a trowel, mortar, blocks and all necessary equipment, tools, and materials; spread mortar on concrete block evenly for at least 24 inches in one spread. Bed outside webs of block. Emphasis will be first on procedure and second on speed.

CHECKLIST

A	N	
( )	( )	1. Safety.
( )	( )	2. Trowel selection.
( )	( )	3. Trowel use.
( )	( )	4. Trowel care.
( )	( )	5. Applied mortar on web.
( )	( )	6. Level.
( )	( )	7. Plumb.
( )	( )	8. Straight.
( )	( )	9. Full head joints formed on both ears of block.
( )	( )	10. Workmanship.
( )	( )	11. Clean and stored tools.
( )	( )	12. Cleaned up work area.
( )	( )	13. Knowledge of assignment.
( )	( )	14. Attitude toward assignment.

2. Bond a block wall

Given dimensions for a wall, block, and the necessary equipment, tools, and materials; bond a block wall. Joint spacing must be uniform, blocks must be with +/- 1/16 inch of specified dimensions, and necessary cuts must be placed at corners. Demonstrate proper dry bonding technique.

CHECKLIST

A	N	
( )	( )	1. Proper technique of dry bonding.
( )	( )	2. Proper bond pattern used.
( )	( )	3. Workmanship.
( )	( )	4. Level.
( )	( )	5. Plumb.
( )	( )	6. Straight.
( )	( )	7. To line.
( )	( )	8. Knowledge of assignment.
( )	( )	9. Attitude toward assignment.
( )	( )	10. Care and use of tools.
( )	( )	11. Safety.

A=Acceptable
N=Not acceptable

3. Build concrete block corner

Given plans and specifications for block corner (wall with corner, etc.), block, mortar, and the necessary tools, equipment, and materials; build a block corner to specifications the required courses high in running bond. Corner must be square, level, plumb, and straightedged, within +/- 1/16 inch of specifications for height and width, have uniform courses, and be laid on specified scale. Finish joints with convex tool and brush.

SUGGESTED CHECKLIST FOR PERFORMANCE EVALUATION

A	N	
( )	( )	1. Planning.
( )	( )	2. Safety.
( )	( )	3. Layout.
( )	( )	4. Spreading mortar.
( )	( )	5. Level.
( )	( )	6. Plumb.
( )	( )	7. Straight.
( )	( )	8. To line.
( )	( )	9. Workmanship.
( )	( )	10. Use of tools.
( )	( )	11. Care of tools.
( )	( )	12. Completeness of job.
( )	( )	13. Cleaned up work area.
( )	( )	14. Knowledge of assignment.
( )	( )	15. Attitude toward assignment.

A = Acceptable
N = Not acceptable

4. Raise concrete block foundation wall

Given a prepared area, block, mortar, and the necessary equipment, tools, and materials and a drawing or plan; construct a concrete block foundation wall to a required height +/- 1/8 inch of specifications. The wall must be straight, level, plumb, and constructed following proper techniques. Strike mortar with convex jointer. The job must be completed within the allocated time and must be acceptable to the instructor for process and product performance.

SUGGESTED CHECKLIST FOR PERFORMANCE EVALUATION

A	N		
( )	( )	1.	Planning.
( )	( )	2.	Safety.
( )	( )	3.	Layout.
( )	( )	4.	Spreading mortar.
( )	( )	5.	Level.
( )	( )	6.	Plumb.
( )	( )	7.	Straight.
( )	( )	8.	To line.
( )	( )	9.	To specified height.
( )	( )	10.	Use of tools.
( )	( )	11.	Care of tools.
( )	( )	12.	Properly tooled joints.
( )	( )	13.	Workmanship.
( )	( )	14.	Cleaned up work area.
( )	( )	15.	Knowledge of assignment.
( )	( )	16.	Attitude toward assignment.
( )	( )	17.	Job completed in allowed time.
( )	( )	18.	Performance process, techniques, etc., to instructor's standards.
( )	( )	19.	Performance product to instructor's standards.

A = Acceptable
N = Not acceptable

SECOND YEAR
SECONDARY LEVEL MASONRY TASK OBJECTIVES

The instructional program described in the following units represent mutual agreement among secondary level participants of the Task Force Committee on Masonry concerning what should be included in the second year of the secondary level masonry vocational program.

It is important to acknowledge that there probably will be some overlap between first and second year training objectives based on such factors as the motivation and ability of the students, training opportunities such as field projects that may be present at a particular time, etc.

UNIT 7.0

SITE PREPARATION, FOUNDATIONS, AND FOOTINGS

SUGGESTED MINIMUM TERMINOLOGY

SITE PREPARATION, FOUNDATIONS, AND FOOTINGS

BATTER BOARDS	Stakes with boards nailed to them forming right angles on the corner of the building, normally set back about 4 feet from actual building line, leveled, used to level the corners of the house by a builder's level using one batter board as reference, designed to hold and preserve building lines during construction.
BENCH MARK	A metal or stone marker placed in the ground by a surveyor with the elevation indicated on it; this is the reference point for determining lines, grades, and elevations in the area.
BUILDER'S LEVEL	An instrument consisting of a telescope, leveling bubble, and tripod used primarily for establishing grade levels and building lines.
BUILDING LINE	Straight reference line used to layout rest of structure, usually front wall of building.
BUILDING PERMIT	An agreement between the builder/brickmason and a city that specifies the type, quality, and extent of construction to be done.
EXCAVATE	To remove soil for a footing or to establish a uniform grade.
FALL	Pertaining to the slope of the line such as inches of fall per foot of run.
FILL	Soil or other substance used to raise the ground level.
GRADE LINE	The level of the ground at the building line.
GRADE STAKE	A stake driven into the ground that located the finished level of the ground at the point (as read from the bench mark).
LEVELING ROD	A rod used in leveling with the builder's level and usually graduated in tenths and hundredths of a foot.
ORDINANCE	A regulation governing the construction of building within a municipality.
SITE	A plot of ground on which a building is to be erected.

MASONRY
SITE PREPARATION, FOUNDATIONS, AND FOOTINGS
SUGGESTED INSTRUCTION TIMES

MASONRY UNIT/TASK		SUGGESTED HOURS
Unit 7.0	SITE PREPARATION, FOUNDATIONS, AND FOOTINGS	
7.01	Set Up and Use the Builder's Level	18
7.02	Identify Property Lines, Reference Points, and Setback	6
7.03	Layout Simple Building Site	24
7.04	Set Up Batter Boards and Attach a Building Line	6
7.05	Locate and Square Corners	9
7.06	Locate and Mark Excavation Lines	6
7.07	Dig Footings and Place Grade Stakes	33
7.08	Construct Stepped Footings	*
7.09	Describe How to Install Steel Reinforcing Bars/Rods	3
7.10	Calculate Concrete for Footings and Foundation Walls	9
7.11	Pour Concrete in a Footing	9
	TOTAL HOURS	123

*Integrated

TASK LISTINGS
MASONRY

UNIT/TASK	DESCRIPTION
Unit 7.0	SITE PREPARATION, FOUNDATIONS, AND FOOTINGS
7.01	(Set Up and Use the Builder's Level) Given a builder's level consisting of an instrument and tripod, assistant with leveling rod, instruction concerning use of the level, and a practical assignment; demonstrate how to set up and use the builder's level. The instructor's standards must be met.
7.02	(Identify Property Lines, Reference Points, and Setback) Given instruction, and orientation to a plot with a plot plan, builder's transit, 100 foot tape, and the necessary tools and materials; identify property lines, reference points, and setback. Identify that stakes must be located with one-fourth inch of plot plans specifications and be secured in the ground and visible from all points on the plot. Identify that setback distance must be in accordance with local code and zoning regulations.
7.03	(Layout Simple Building Site) Given a plot with plot and foundation plans, builder's transit, 100 foot tape, and necessary tools and materials; layout a simple building site, stake for corner location, footing lines, and batter boards. All building lines must be located to exact measurements according to dimensions on the blueprints.
7.04	(Set Up Batter Boards and Attach a Building Line) Given the blueprint of a building and access to the necessary tools and materials; set up batter boards and attach a building line. Batter boards must be level and secured. Stakes must be placed at least 16 inches from building line (often are set back a minimum of 4 feet from actual building line).
7.05	(Locate and Square Corners) Given the necessary tools and equipment, set up instruments, locate and square corners, according to plans.
7.06	(Locate and Mark Excavation Lines) Given necessary tools and equipment and a set of working drawings for a simple structure; locate and accurately layout excavation areas with a stretched line of visible material such as lime spread on ground.

7.07 (Dig Footings and Place Grade Stakes) Given a blueprint and access to necessary tools and materials, dig a footing and place grade stakes to specifications. The bottom of the footing must be square and equal with the same width as the top. Grade stakes must be secured and leveled to the height where concrete is to be poured.

7.08 (Construct Stepped Footings) Given sloping ground on which to build, a builder's level if needed, and the necessary form materials; layout and build, if required, a stepped footing to provide a level footing on an uneven grade. Meet instructor's standards.

7.09 (Describe How to Install Steel Reinforcing Bars/Rods) Given a blueprint, 5/8 inch rods, a footing and access to necessary tools and materials; describe how to install steel reinforcing bars/rods in footing as required by specifications. Identify that rods must remain in center of footing, be within +/- 1/2 inch of required distance apart, have a 90 degree bend at corners and be elevated from the bottom of the footing.

7.10 (Calculate Concrete for Footings and Foundation Walls) Given a complete detailed set of footing and foundation plans for a structure, calculate the total number of cubic yards of concrete required for the job. Mathematical calculations must be accurate.

7.11 (Pour Concrete in a Footing) Given a footing and access to the necessary tools and equipment, pour concrete in the footing so the concrete is level with the top of stakes and aggregate is worked into the concrete.

UNIT 7.0 SITE PREPARATION, FOUNDATIONS, AND FOOTINGS

TASK 7.01 SET UP AND USE THE BUILDER'S LEVEL

PERFORMANCE OBJECTIVE:

Given a builder's level consisting of an instrument and tripod, assistant with leveling rod, instructions concerning use of the level, and a practical assignment; demonstrate how to set up and use the builder's level. The instructor's standards must be met.

PERFORMANCE ACTIONS:

7.0101 Set up tripod so head plate is level.

7.0102 Tighten tripod leg thumb nuts and check head plate for level.

7.0103 Properly remove builder's level instrument from carrying case and attach it to head plate on tripod, securely screwing it down.

7.0104 Remove dust caps from instrument, if applicable, and attach sun shade if applicable.

7.0105 Align telescope barrel directly over one pair of leveling screws.

7.0106 Rotate screws under leveling head to center bubble in leveling tube. Check to see if bubble is centered.

7.0107 Rotate instrument clockwise 90 degrees to align it with the other pair of leveling screws.

7.0108 Level bubble.

7.0109 Focus cross hairs so they are clear and sharp. (Focus to infinity)

7.0110 Point level at target and bring target into sharp focus.

7.0111 Use hand motion signals to direct helper in positioning rod.

7.0112 Read leveling rod scale as required by job.

PERFORMANCE STANDARDS:

- Demonstrate proper procedures in setting up and using the builder's level, in using hand motion signals to direct helper in positioning rod, and read level rod as required to complete job assignment.
- Instructor's standards must be met.

SUGGESTED INSTRUCTION TIME: 18 Hours

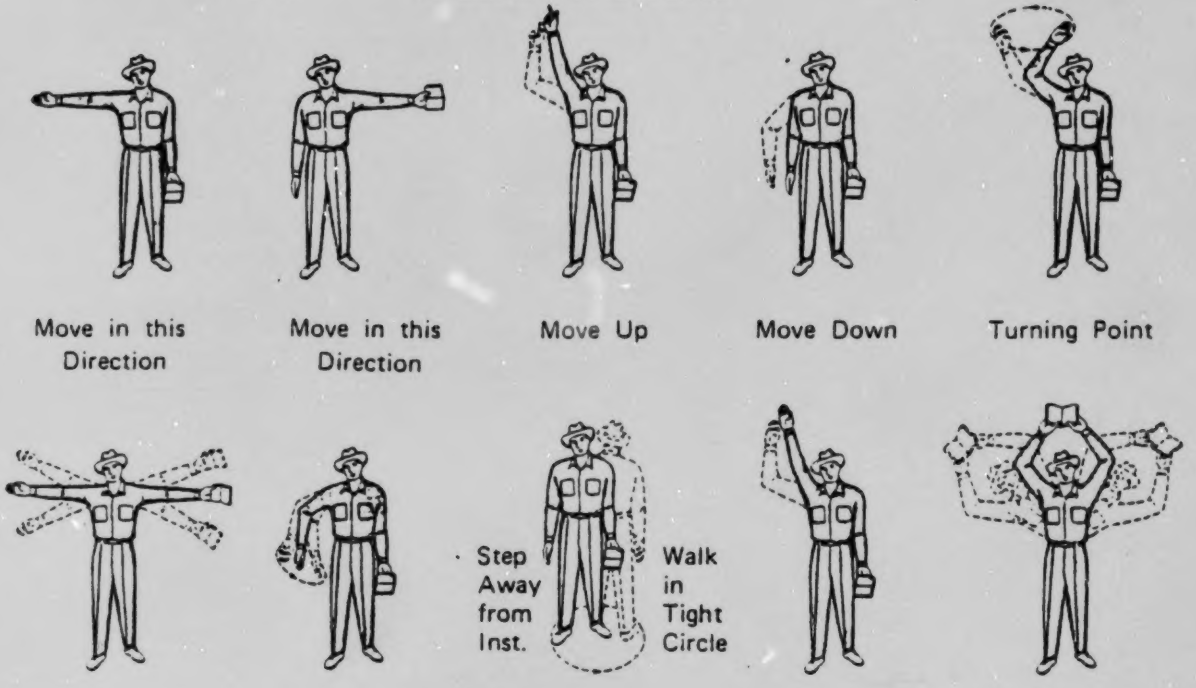
RELATED TECHNICAL INFORMATION:

- Identify a bench mark (know point of elevation).
- Identify a temporary bench mark.
- Define: Fall (slope of a line, inches of fall per foot or run). Grade line (proposed or future level of ground at construction line). Grade stake (marker driven into ground locating proposed grade).
- Identify the parts of a Builder's level.
- Describe the parts of a leveling rod.
- Describe how to site a target.
- Demonstrate common hand/arm signals to move level man.
- Describe how to read a leveling rod.

Hand motions that might be employed in using the builder's level and leveling rod will be selected by the instructor. The hand motions illustrated on this page probably exceed the typical motions that would be used normally.

In addition, where there is extensive use of the builder's level and leveling rod, many users are communicating by short-range 2-way voice-operated FM headsets which current costs less than $100 per pair. Where there is extensive use of the builder's level, there probably will be less use of hand motions for communications in the future.

Hand Motions



Move in this Direction

Move in this Direction

Move Up

Move Down

Turning Point

Observation Completed or Move On or Understood

Come In

Wrong Face or Check Clamp or Rod Upside Down

Use Long Rod

Wave Rod from Side to Side

UNIT 7.0 — SITE PREPARATION, FOUNDATIONS, AND FOOTINGS

TASK 7.02 — IDENTIFY PROPERTY LINES, REFERENCE POINTS, AND SETBACK

PERFORMANCE OBJECTIVE:

Given instruction, and orientation to a plot with a plot plan, builder's transit, 100 foot tape, and the necessary tools and materials; identify property lines, reference points, and setback. Identify that stakes must be located with one-fourth inch of plot plans specifications and be secured in the ground and visible from all points on the plot. Identify that setback distance must be in accordance with local code and zoning regulations.

PERFORMANCE ACTIONS:

7.0201 Explain how to locate property lines on a plot plan from a set of datum.

7.0202 Describe how to determine reference point.

7.0203 Describe how to set up and use transit.

7.0204 Demonstrate the ability to:

a. Set up and adjust a builder's level.
b. Set up and adjust a transit over a point and establish lines with two given points.
c. Perform a differential leveling job.

7.0205 Identify hand motions used by the instrument person to guide the target person.

7.0206 List procedures for locating property lines.

PERFORMANCE STANDARDS:

- Describe how to locate property lines, reference points, and setback within 1/2 inch of instructor's findings.
- (Orientation/Familiarization Task)

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Reading property descriptions, working drawings.
- Measuring with 100 foot tape.

UNIT 7.0 SITE PREPARATION, FOUNDATIONS, AND FOOTINGS

TASK 7.03 LAYOUT SIMPLE BUILDING SITE

PERFORMANCE OBJECTIVE:

Given a plot with plot and foundation plans, builder's transit, 100 foot tape, and the necessary tools and materials; layout a simple building site, stake for corner location, footing lines, and batter boards. All building lines must be located to exact measurements according to dimensions on the blueprints.

(NOTE: Purpose of this task objective is orientation/familiarization.)

PERFORMANCE ACTIONS:

7.0301 Locate building lines on a foundation plan.

7.0302 Locate reference point.

7.0303 Transfer site information from plan to plot.

7.0304 Select and use equipment.

7.0305 Describe the procedure for locating and aligning with a bench mark.

PERFORMANCE STANDARDS:

- Stake out a simple building site with an accuracy of 1/4 inch using working drawings provided.

SUGGESTED INSTRUCTION TIME: 24 Hours

RELATED TECHNICAL INFORMATION:

- Use a Builder's Level.
- Measuring with 100 foot tape.

UNIT 7.0 SITE PREPARATION, FOUNDATIONS, AND FOOTINGS

TASK 7.04 SET UP BATTER BOARDS AND ATTACH A BUILDING LINE

PERFORMANCE OBJECTIVE:

Given the blueprint of a building and access to the necessary tools and materials; set up batter boards and attach a building line. Batter boards must be level and secured. Stakes must be placed at least 16 inches from building line (often are set back a minimum of 4 feet from actual building line).

PERFORMANCE ACTIONS:

7.0401	Explain purpose of batter boards.
7.0402	Explain techniques for making and placing stakes.
7.0403	Demonstrate placing line boards on stakes.
7.0404	Demonstrate cutting line board for line and fastening line to line board.
7.0405	Describe leveling procedures for batter boards.
7.0406	Explain the relevant safety precautions/ procedures.

PERFORMANCE STANDARDS:

- Using materials provided, erect batter boards at correct locations.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Layout irregular building by a series of squares and rectangles with Builder's Level.
- Preliminary tasks:
    a. Locate building corners
    b. Indicate outside line of foundation walls by nails in stakes
    c. Check squareness of corners

UNIT 7.0 — SITE PREPARATION, FOUNDATIONS, AND FOOTINGS

TASK 7.05 — LOCATE AND SQUARE CORNERS

PERFORMANCE OBJECTIVE:

Given the necessary tools and equipment, set up instruments, locate and square corners, according to plans.

PERFORMANCE ACTIONS:

7.0501 Describe procedures for locating and squaring corners by using builder's transit.

7.0502 Demonstrate procedure for locating a transit over a hub on a desired corner.

7.0503 Demonstrate the procedure for plumbing down to nail in the hub.

7.0504 Explain reason for securing points.

7.0505 Explain the procedure for recording degrees on index when stakes are located.

7.0506 Explain the procedure for subtracting required number at degrees for squaring.

7.0507 Describe the procedure for locating and squaring corners by using triangulation, parallel, and diagonal methods.

PERFORMANCE STANDARDS:

- Locate and square building corners using Builder's Level.
- Maintain setback +/- 1 inch.
- Maintain allowable side and rear boundary lines +/- 1 inch.
- Corners must be 90 degrees.
- Footlines must be level and parallel to corresponding building.

SUGGESTED INSTRUCTION TIME: 9 Hours

RELATED TECHNICAL INFORMATION:

- Builder's Level.
- Triangulation, parallel, and diagonal (6-8-10 method) methods of layout.

UNIT 7.0	SITE PREPARATION, FOUNDATIONS, AND FOOTINGS
TASK 7.06	LOCATE AND MARK EXCAVATION LINES

PERFORMANCE OBJECTIVE:

Given necessary tools and equipment and a set of working drawings for a simple structure; locate and accurately layout excavation areas with a stretched line or visible material such as lime spread on ground.

(NOTE: Purpose of this task objective is orientation/familiarization.)

PERFORMANCE ACTIONS:

7.0601	Determine reference point.
7.0602	Select and prepare tools and equipment.
7.0603	Determine distance between building lines and excavation lines.
7.0604	Demonstrate coding building and excavation lines.
7.0605	List procedures.
7.0606	Check for accuracy.

PERFORMANCE STANDARDS:

- Mark excavation lines according to plan specifications.

SUGGESTED INSTRUCTION TIME: 6 Hours

UNIT 7.0 SITE PREPARATION, FOUNDATIONS, AND FOOTINGS

TASK 7.07 DIG FOOTINGS AND PLACE GRADE STAKES

PERFORMANCE OBJECTIVE:

Given a blueprint and access to necessary tools and materials, dig a footing and place grade stakes to specifications. The bottom of the footing must be square and equal with the same width as the top. Grade stakes must be secured and leveled to the height where concrete is to be poured.

PERFORMANCE ACTIONS:

7.0701 Demonstrate the technique for leveling stakes.

7.0702 Explain how the size of footings are determined.

7.0703 Explain stepping up in footing and when it is necessary.

PERFORMANCE STANDARDS:

- Footing should be level, grades to +/- 1 inch for proper elevation and proper dimensions.
- Set grade stakes for given building lot to specifications meeting instructor's standards, with stakes secured and leveled to a height where the concrete is to be poured.

SUGGESTED INSTRUCTION TIME: 33 Hours

RELATED TECHNICAL INFORMATION:

- Bulkhead installation.

UNIT 7.0 SITE PREPARATION, FOUNDATIONS, AND FOOTINGS

TASK 7.08 CONSTRUCT STEPPED FOOTINGS

PERFORMANCE OBJECTIVE:

Given sloping ground on which to build, a builder's level if needed, and the necessary form materials; layout and build, if required, a stepped footing to provide a level footing on an uneven grade. Meet instructor's standards.

PERFORMANCE ACTIONS: (Task description for concrete block foundation.)

7.0801 Use builder's level to layout stepped footing forms.

7.0802 Each step must be level and positioned in increments of 8 inches (course of concrete block) from the top of the next step.

7.0803 Steps should be no more than 2 feet high and no less than 2 feet long (to prevent settling and cracking).

7.0804 For a sharp drop in the grade, use several steps.

7.0805 Insert steel rods to increase the strength of the footing.

PERFORMANCE STANDARDS: *Integrated

- Construct stepped footing to provide a level footing on uneven grades.
- Instructor's standards must be met.

SUGGESTED INSTRUCTION TIME:

RELATED TECHNICAL INFORMATION:

- Identify the term, "Hog out."
- Describe how to layout a stepped footing.
- Describe how to build a stepped footing form (for concrete block).

UNIT 7.0 SITE PREPARATION, FOUNDATIONS, AND FOOTINGS

TASK 7.09 DESCRIBE HOW TO INSTALL STEEL REINFORCING BARS/RODS

PERFORMANCE OBJECTIVE:

Given a blueprint, 5/8 inch rods, a footing and access to necessary tools and materials; describe how to install steel reinforcing bars/rods in footing as required by specifications. Identify that rods must remain in center of footing, be within +/- 1/2 inch of required distance apart, have a 90 degree bend at corners and be elevated from the bottom of the footing.

(NOTE: This task objective for orientation/familiarization.)

PERFORMANCE ACTIONS:

7.0901 Describe requirements for placing steel rods:

a. Overlapping.
b. Tying.
c. Elevation of rods.

7.0902 Explain methods for bending rods.

7.0903 Identify various sizes of footings and rods.

PERFORMANCE STANDARDS:

- Describe how to place steel reinforcing bars/rods in footing as required by specifications so that the rods are in the center of the footing within +/- 1/2 inch of required distance apart, 90 degree bend at corners, elevated from bottom of footing.
- Steel placed on about 4 inches of concrete (not on ground) to ensure steel reinforcement is encased in concrete.

SUGGESTED INSTRUCTION TIME: 3 Hours

UNIT 7.0 SITE PREPARATION, FOUNDATIONS, AND FOOTINGS

TASK 7.10 CALCULATE CONCRETE FOR FOOTINGS AND FOUNDATION WALLS

PERFORMANCE OBJECTIVE:

Given a complete detailed set of footing and foundation plans for a structure, calculate the total number of cubic yards of concrete required for the job. Mathematical calculations must be accurate.

PERFORMANCE ACTIONS:

7.1001 Determine size of footings (thickness x width x length).

7.1002 Determine size of foundation walls (thickness x width x length).

7.1003 Calculate the required amount of concrete for the footing. (Nearest 1/4 yard over.*)

7.1004 Calculate the required amount of concrete for the foundation wall. (*See above)

7.1005 Combine the sub-totals into a total figure for the job to 5 percent accuracy.

PERFORMANCE STANDARDS:

- Using foundation detail drawings, make the necessary calculations for concrete for footings and foundation walls.
- The total for the concrete needed should be within +/- 5 percent of the instructor's calculations.

SUGGESTED INSTRUCTION TIME: 9 Hours

TASK 7.11 POUR CONCRETE IN A FOOTING

PERFORMANCE OBJECTIVE:

Given a footing and access to the necessary tools and equipment, pour concrete in the footing so the concrete is level with the top of stakes and aggregate is worked into the concrete.

(NOTE: Purpose of this task objective is orientation/familiarization.)

PERFORMANCE ACTIONS:

7.1101 Determine consistency of mix (water to add) on site.

7.1102 Explain the importance of vibrating or tamping concrete (compacting).

7.1103 Identify vibrating and tampering tools.

PERFORMANCE STANDARDS:

- Pour concrete footing level with stake markers, work aggregate into concrete.
- Transfer concrete from truck to foundation with minimum amount of wheeling in wheelbarrow.
- Consistency of mix determined on site by mason.
- Top left rough for bonding.
- All footing laid in one day, with no breaking so that it cures as one mass.

SUGGESTED INSTRUCTION TIME: 9 Hours

Unit 7.0

STUDENT: ______________________________ DATE: __________

1. Match the terms at the bottom to the correct definitions.

___ A. Rod used in leveling; normally graduated in tenths and hundredths of a foot.

___ B. Pertaining to the slope of a line, such as inches of fall per foot of run.

___ C. Permanent point of known or assumed elevation.

___ D. Proposed or future level of ground at construction line.

___ E. Stake driven into the ground locating the proposed grade.

___ F. Elevation of the level line of sight or of the cross hairs in the telescope with respect to the bench mark (height of instrument above or below bench mark).

___ G. Elevation reference point.

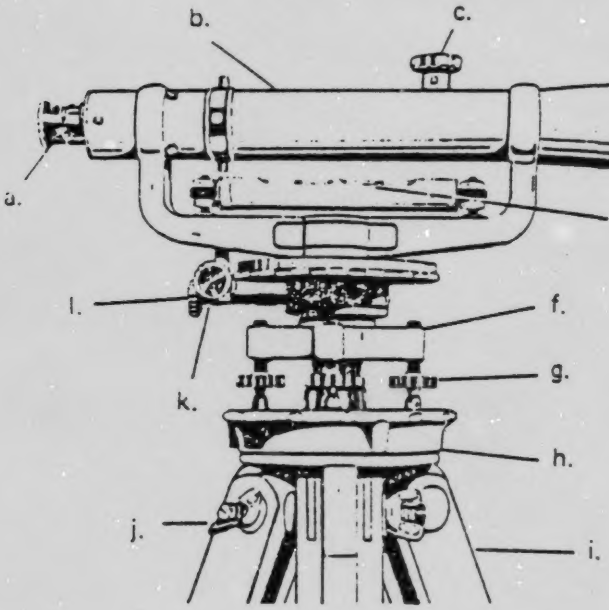
___ H. Scale on rod adjusted to height of instrument elevation and direct surface elevation read by instrument man.

___ I. Method of leveling by which the difference in elevation between two points is determined by "+" (plus) and "-" (minus) rod readings which are totaled and adjusted to the bench mark.

___ J. Elevation of finished floor in relation to bench mark.

a. bench mark
b. site
c. line of sight
d. fall
e. grade line
f. grade stake
g. level rod
h. height of instrument
i. self-reading rod
j. differential leveling
k. temporary leveling
l. finished floor height
m. four foot masonry reference mark

2. Identify the parts of the builder's level by writing names in the blanks. Instructor's standards for competency apply.



a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

f. ____________________

g. ____________________

h. ____________________

i. ____________________

j. ____________________

k. ____________________

l. ____________________

STUDENT: ______________________________ DATE: __________

PERFORMANCE TESTS

1. Layout simple building site

Given a site with plot and foundation plans, builder's transit, 100' tape, and the necessary tools and materials; layout a simple building site, stake for corner location, footing lines, and batter boards. All building lines must be located to exact measurements according to dimensions on the blueprints. Measurements should be to 1/4 inch accuracy. Standards for acceptable performance are those established by the instructor.

CHECKLIST FOR EVALUATION

A	N		
( )	( )	1.	Set up builder's level.
( )	( )	2.	Properly used builder's level.
( )	( )	3.	Identified a bench mark.
( )	( )	4.	Sited a target and read elevation of given points.
( )	( )	5.	Able to identify setbacks, +/- 1 inch.
( )	( )	6.	Transferred data from plan to plot.
( )	( )	7.	Measured with 100' tape correctly, +/- 1/16 inch.
( )	( )	8.	Correctly located corners, footing lines, and batter boards.
( )	( )	9.	Set up batter boards and a building line.
( )	( )	10.	Located and squared corners to 90 degrees.

2. Given a 37' long x 2' wide area in which concrete is to be filled to a thickness of 4 inches, determine to the nearest 1/4 yard high the amount of concrete which should be ordered.

calculations

answer __________

3. Calculate concrete needed for a 2' x 5' x 4" foundation and indicate answer in yards.

answer __________

A = Acceptable
N = Not acceptable

UNIT 8.0

CHIMNEYS AND FIREPLACES
(Residential)

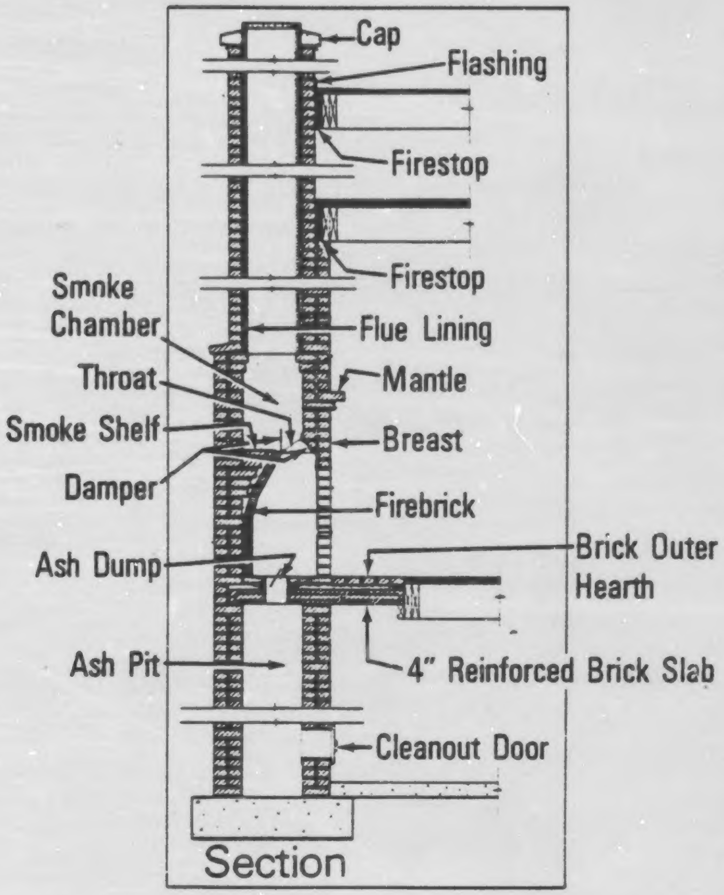
The purpose of this unit is to introduce the brickmasonry student to the basic theories and construction techniques required to build safe and efficient residential chimneys and fireplaces.

CHIMNEYS AND FIREPLACES

MINIMUM SUGGESTED TERMINOLOGY

CLEANOUT DOOR	Metal framed door used to clean out ashes.
ASH DUMP	Metal door set in firebrick floor of fireplace to remove ashes into ash pit.
BRICK OUTER HEARTH	Brick or tile floor that extends from face of fireplace and full length of fireplace.
FIREBRICK	Brick made of ceramic material which will resist high temperatures.
CORBEL	Shelf or ledge formed by projecting successive sources of masonry out of face of wall.
THROAT	Opening at top of fireplace through which smoke passes to smoke chamber and chimney.
DAMPER	Metal frame unit with adjustable door positioned on top of firebrick of combustion chamber.
SMOKE SHELF	Shelf directly in back of throat of damper that prevents downdraft.
SMOKE CHAMBER	Fireplace space above the throat where smoke gathers before passing into flue, narrowed by cutting bricks and parging to the size of the flue lining above.
FLUE LINING	One or more chimney passages designed to remove smoke and gases.
FIRESTOP	Brickwork on walls between joints to prevent spread of fire.
FLASHING	Metal such as lead, copper or aluminum placed in mortar joints and through air spaces in masonry to prevent water penetration or provide water drainage.
CAP	Reinforced piece of concrete at top of chimney.
MANTEL	Shelf projecting from face of fireplace.

Parts of a Fireplace


Cap
Flashing
Firestop
Firestop
Smoke Chamber
Flue Lining
Throat
Mantle
Smoke Shelf
Breast
Damper
Firebrick
Ash Dump
Brick Outer Hearth
Ash Pit
4" Reinforced Brick Slab
Cleanout Door
Section

MASONRY
CHIMNEYS AND FIREPLACES
SUGGESTED INSTRUCTION TIMES

MASONRY UNIT/TASK		SUGGESTED HOURS
Unit 8.0	CHIMNEYS AND FIREPLACES	
8.01	Layout a Chimney (Foundation)	6
8.02	Build an Ash Pit	*
8.03	Install a Clean-Out Door	*
8.04	Lay Fireplace Floor (Rough Hearth) and Rough-in an Ash Dump	*
8.05	Lay Throat, Install Damper, and Form a Smoke Shelf	*
8.06	Build a Chimney (Smoke Chamber)	*
8.07	Cut Flue Liner	*
8.08	Set Flue	*
8.09	Top and Cap Chimney	*
8.10	Prepare Chimney for Flashing	*
8.11	Lay an Outer Hearth	*
8.12	Finish Back, Bottom, and Sides of Fireplace	*
8.13	Lay a Mantel	*
8.14	(OPTIONAL, ORIENTATION) Install a Heatilator	N/A
	TOTAL HOURS	96

*Instructional planning time is summarized for the unit since tasks are learned as a continuous process rather than on a task by task basis.

TASK LISTINGS
MASONRY

UNIT/TASK	DESCRIPTION
Unit 8.0	CHIMNEYS AND FIREPLACES
8.01	(Layout a Chimney [Foundation]) Provided with a set of blueprints or drawings for a chimney, a prepared area (shop floor), and the necessary tools and materials; layout a chimney according to given instruction. The laid out chimney foundation must be square and within +/- 1/16 inch of specifications for the size and location.
8.02	(Build an Ash Pit) Provided with specifications or drawing for an ash pit, brick, mortar, and the necessary tools, equipment, and materials; build an ash pit. The pit must provide sufficient space for ashes to fall through, and be built to fit a given ash dump door.
8.03	(Install a Clean-Out Door) Provided with specifications for a clean-out door, door, and the necessary supplies, tools; install a clean-out door that is level, plumb, and mounted securely.
8.04	(Lay Fireplace Floor [Rough Hearth] and Rough-in an Ash Dump) Provided with specifications for a fireplace floor, with ash dump, brick, mortar, and the necessary tools, equipment, and materials; lay a fireplace floor and rough-in an ash dump. The floor must be level and laid in the desired bond with back and side walls. The joints must be crack-free, and not exceed 3/8 inch of thickness. The ash dump must fit in the center of the firebox floor, be placed within 2-3 inches from the back of the firebox, and the door must swing toward the back of the firebox when open.
8.05	(Lay Throat, Install Damper, and Form a Smoke Shelf) Given the rough foundation work for a fireplace/chimney, brick, mortar, and the necessary tools and instructions for installing a damper; lay throat, install damper, and form a smoke shelf. The throat must be sloped to support the back of the damper and must be from 6-8 inches above the fireplace opening. The damper must be level and door must open and close freely. The smoke shelf must be directly under the bottom of the flue, extend the full width of the throat and be constructed horizontally.

8.06 (Build a Chimney [Smoke Chamber]) Given plans/drawings, foundation for chimney, and the necessary tools, equipment, and materials; build a smoke chamber. Corbeling must not exceed 1 1/2 inches per course, all courses must be evenly corbeled, and all joints must have full head joints. Smoke shelf must be directly under the bottom of the flue, extend the full width of the throat and be constructed horizontally.

8.07 (Cut Flue Liner) Provided with specifications, tools and sand for inside of flue; cut flue liner as required. The cut must be along marked line with no cracks or breaks in lining.

8.08 (Set Flue) Given requirements for a flue, brick, mortar, and the required tools, equipment, and materials; set the flue. Bed joints between flues must be smooth, free of holes, sealed, and set in line with previous flues.

8.09 (Top and Cap Chimney) Given specifications/requirements, brick, mortar, and tools; lay brick to cap out a chimney. Brick should be plumb, level, and straight. Put wash on chimney with proper slope so it will shed water.

8.10 (Prepare Chimney for Flashing) Given flashing material, pitch, and proper tools; flash a chimney. Work must be waterproof, smooth, and tightly secured.

Orientation/demonstration task.

Typically, flashing the chimney will be the job of the carpenter: Therefore, this task is primarily orientation.

8.11 (Lay an Outer Hearth) Provided with specifications/requirements for an outer hearth, brick, mortar, and the necessary tools, equipment, and materials; lay an outer hearth. The hearth must be level, square and plumb with full joints and set in a 3/8 inch mortar bed. The top of the hearth must be level with the firebox floor or inner hearth.

8.12 (Finish Back, Bottom, and Sides of Fireplace) Given the necessary brick, mortar, tools, and materials; lay the back, bottom, and sides of a given fireplace. The back of the fireplace must begin sloping forward from 14-16 inches above the fireplace and should fit underneath the flange and be smooth with the inside opening of the damper. The sides must be level, plumb, and straight. The bottom must be level and lain in the desired bond with the back and side walls. All joints must be 3/8 inches thick, fully filled and finished, and bonded with the back wall.

8.13 (Lay a Mantel) Given specifications for a mantel, brick, mortar, and the necessary tools, equipment, and materials; lay a mantel. Each corbel must not project more than one inch and each corbeled course must be straight, level, and plumb.

8.14 (Install a Heatilator) Given specifications for a heatilator, brick, mortar, heatilator, and the necessary tools, equipment, and materials; enclose a heatilator. Insulation must completely cover the unit with masonry work without touching the unit. All work must be square, plumb, level, and straight around heatilator.

Optional training depending upon availability of heatilator and training time. Typically, this optional task will be employed for advanced students or will be covered as an orientation task.

TASK 8.01 LAYOUT A CHIMNEY (FOUNDATION)

PERFORMANCE OBJECTIVE:

Provided with a set of blueprints or drawings for a chimney, a prepared area (shop floor), and the necessary tools and materials; layout a chimney according to given instructions. The laid out chimney foundation must be square and within +/- 1/16 inch of specifications for the size and location.

PERFORMANCE ACTIONS:

8.0101	Layout and pour footing for chimney base.
8.0102	Study plans and mark with pencil and square or strike a chalk line on footing to indicate size on plans/drawings.
8.0103	Dry bond bricks for proper mortar head joint.

PERFORMANCE STANDARDS:

- Layout a residential chimney (foundation) according to given prints/drawings so that the chimney is square within +/- 1/16 inch of specifications for the size and location and situated at the designated location.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Describe functions of a chimney.
- Identify code standards for residential chimney dimensions (flue requirements, etc.).
- Describe recommended dimensions for chimney footings (solid concrete base below first line).
- Describe chimney flashing and counterflashing (kinds, placing, sealing, securing flashing).
- Describe requirements for cap of chimney.
- Identify safety considerations in layout of a chimney.

UNIT 8.0 CHIMNEYS AND FIREPLACES

TASK 8.02 BUILD AN ASH PIT

PERFORMANCE OBJECTIVE:

Provided with specifications or drawing for an ash pit, brick, mortar, and the necessary tools, equipment, and materials; build an ash pit. The pit must provide sufficient space for ashes to fall through, and be built to fit a given ash dump door.

(Continuation of previous task.)

PERFORMANCE ACTIONS: (NOTE: Continuation of previous task.)

8.0201 Remove dry bond from lines.

8.0202 Spread mortar.

8.0203 Lay first header, adjusting as necessary to make bond work.

8.0204 Lay correct number of courses to height of cleanout door (4-5 courses) forming ash pit.

PERFORMANCE STANDARDS:

- Build an ash pit according to specifications so that there is sufficient space for ashes to fall through and to fit a given ash dump door.

SUGGESTED INSTRUCTION TIME: *Integrate training task.

RELATED TECHNICAL INFORMATION:

- Discuss use and advantages of ash pits.
- Describe various ways of making ash pits.
- Identify safety considerations.

UNIT 8.0 CHIMNEYS AND FIREPLACES

TASK 8.03 INSTALL A CLEAN-OUT DOOR

PERFORMANCE OBJECTIVE:

Provided with specifications for a clean-out door, door, and the necessary supplies, tools; install a clean-out door that is level, plumb, and mounted securely.

PERFORMANCE ACTIONS:

8.0301 Check size of clean-out door.

8.0302 Measure to center of chimney.

8.0303 Place center of clean-out door at center of chimney.

8.0304 Plumb and level door.

8.0305 Brick tightly around door and anchor to bricks which are laid tightly behind lip of clean-out door.

8.0306 Place necessary lintel to cross over top of door.

PERFORMANCE STANDARDS:

- Install a clean-out door for a given chimney construction so that the door is level, plumb, with bricks behind lip of door, and mounted securely.

SUGGESTED INSTRUCTION TIME: *Integrate training task.

RELATED TECHNICAL INFORMATION:

- Describe/demonstrate procedure for placing clean-out door.
- Explain operation/purpose of clean-out door.
- Identify safety considerations.

TASK 8.04 LAY FIREPLACE FLOOR (ROUGH HEARTH) AND ROUGH-IN AN ASH DUMP

PERFORMANCE OBJECTIVE:

Provided with specifications for a fireplace floor, with ash dump, brick, mortar, and the necessary tools, equipment, and materials; lay a fireplace floor and rough-in an ash dump. The floor must be level and laid in the desired bond with back and side walls. The joints must be crack-free, and not exceed 3/8 inch of thickness. The ash dump must fit in the center of the firebox floor, be placed within 2-3 inches from the back of the firebox, and the door must swing toward the back of the firebox when open.

*See task, "Lay an Outer Hearth"

PERFORMANCE ACTIONS:

8.0401 Install plywood or short lengths of lumber under hearth area, nailed to wood strips located on headers that surround hearth area in floor. (Build forms for concrete.)

8.0402 Place steel reinforcing rods over forms and tie them together with wire, forming squares.

8.0403 Build form at inner hearth where ash dump will be located.

8.0404 Place concrete in forms and vibrate it down around steel rods.

8.0405 Leave or remove concrete forms as appropriate or as builder requires.

8.0406 Knock out form from ash dump hole.

PERFORMANCE STANDARDS:

- Lay a fireplace floor and install as ash dump according to specifications.
- The floor must be level, laid in the specified bond with back and side walls.
- Joints must be crack-free, not exceeding 3/8 inch of thickness.

TASK 8.04 LAY FIREPLACE FLOOR (ROUGH HEARTH) AND ROUGH-IN AN ASH DUMP

PERFORMANCE STANDARDS (Con't.):

- The ash dump must fit in the center of the firebox floor, be placed with 2-3 inches from the back of the firebox and the door must swing toward the back of the firebox when open.

SUGGESTED INSTRUCTION TIME: *Integrate training task.

RELATED TECHNICAL INFORMATION:

- Identify ash dump door operation.
- Describe firebrick and why and how they are used.
- Describe construction procedure for an elevated fireplace floor.
- Describe procedure for laying a firebrick floor and installing an ash dump.
- Identify safety considerations.

UNIT 8.0 CHIMNEYS AND FIREPLACES

TASK 8.05 LAY THROAT, INSTALL DAMPER, AND FORM A SMOKE SHELF

PERFORMANCE OBJECTIVE:

Given the rough foundation work for a fireplace/chimney, brick, mortar, and the necessary tools and instructions for installing a damper; lay throat, install damper, and form a smoke shelf. The throat must be sloped to support the back of the damper and must be from 6-8 inches above the fireplace opening. The damper must be level and door must open and close freely. The smoke shelf must be directly under the bottom of the flue, extend the full width of the throat and be constructed horizontally.

PERFORMANCE ACTIONS:

8.0501 SET THROAT:

a. As height of firebrick (back) wall increases, lay a clipped header to top of shelf which will be a full header, leaving 1/2 inch expansion between firebrick and backing (rough-in) wall.
b. Check to ensure masonry unit used as backing wall is level with last course of firebrick laid so a level smoke shelf is formed.

8.0502 INSTALL DAMPER:

a. Assemble damper unit for installation.
b. Check operation of damper door.
c. Set damper in fireplace in mortar bed and tap down lightly to settle firmly. (Damper should be at least one course of firebrick higher than the angle iron lintel which covers the opening on front of fireplace.
d. Smooth mortar around edges of damper at point where it sets on firebox wall.
e. Point up mortar joints on underside of damper, fully closing any holes.
f. Check operation of damper.

8.0503 FORM SMOKE SHELF:

a. Slush in with mortar all flatwork at damper height.

TASK 8.05 LAY THROAT, INSTALL DAMPER, AND FORM A SMOKE SHELF

PERFORMANCE ACTIONS (Con't.):

b. Corbel brickwork in front which rest on edge of damper and both sides corbeled unit until it narrows and meets area where flue sets. (Corbeling should not exceed 3/4 inch per course.)
c. Smoothly parge underside of corbeling with mortar.
d. Set flue lining.

PERFORMANCE STANDARDS:

- Lay throat, install damper, and form a smoke shelf according to directions/specifications given so that the throat, is corbeled to front at proper angle, so damper is 6-8 inches above fireplace opening, and damper is level and operates freely.
- The smoke shelf must be directly under the bottom of the flue and must extend the full width of the throat and be constructed horizontally.

SUGGESTED INSTRUCTION TIME: *Integrate training task.

RELATED TECHNICAL INFORMATION:

- Describe/demonstrate procedures/technique for laying a throat.
- Identify a poker control and rotary control damper.
- Describe considerations in installing a damper.
- Explain operation of a damper.
- Describe the construction of a smoke shelf and explain how the smoke shelf operates.
- Identify safety considerations.
- Use safety goggles when cutting brick.
- Planning the fireplace/chimney for safe operation.

TASK 8.06 BUILD A CHIMNEY (SMOKE CHAMBER)

PERFORMANCE OBJECTIVE:

Given plans/drawings, foundation for chimney, and the necessary tools, equipment, and materials; build a smoke chamber. Corbeling must not exceed 1 1/2 inches per course, all courses must be evenly corbeled, and all joints must have full head joints. Smoke shelf must be directly under the bottom of the flue, extend the full width of the throat and be constructed horizontally.

PERFORMANCE ACTIONS: (Single Face Chimney)

8.0601 Fill in solid with masonry material behind back of fireplace.

8.0602 Spread mortar horizontally on top of fill masonry material.

8.0603 Smooth mortar horizontally on top of fill masonry material behind damper.

8.0604 Remove excess masonry material damper.

8.0605 Top and cap chimney.

(NOTE: Optional task expansion may include building a double face chimney.)

PERFORMANCE STANDARDS:

- Build a chimney or smoke chamber from given plans/drawings using the foundation provided.
- The smoke shelf must be directly under the bottom of the flue, extend the full width of the throat and be constructed horizontally.
- Corbeling must not exceed 1 1/2 inches per course, all courses must be evenly corbeled, and all joints must have full heat joints.
- Put wash on chimney with proper slope so as to shed water.

SUGGESTED INSTRUCTION TIME: *Integrate training task.

RELATED TECHNICAL INFORMATION:

- Protective flashing.
- Sloping wash.
- Height of flue liner.

RELATED TECHNICAL INFORMATION (Con't.):

- Height of chimney above roof.
- Describe how to corbel last two courses 1/2 inch to outside for drip.
- Filling inside void.
- Placing mortar for wash.
- Sloping wash to outside to shed water.
- Striking joints and brush work.

UNIT 8.0 CHIMNEYS AND FIREPLACES

TASK 8.07 CUT FLUE LINER

PERFORMANCE OBJECTIVE:

Provided with specifications, tools and sand for inside of flue; cut flue liner as required. The cut must be along marked line with no cracks or breaks in lining.

PERFORMANCE ACTIONS:

8.0701	Measure cut to be made in/on flue liner (straight cut for length, thimble hole, etc.).
8.0702	Trace cut line on flue lining.
8.0703	Fill/pack flue lining with damp sand to support cutting.
8.0704	Tap lightly with hammer and sharp chisel along line to make cut.

PERFORMANCE STANDARDS:

- Cut flue liner to requirements so that the cut is made to line with no cracks or breaks in lining.

SUGGESTED INSTRUCTION TIME: *Integrate training task.

RELATED TECHNICAL INFORMATION:

- Marking flue liner for cut.
- Technique of cutting flue liner.
- Shapes of flue liners.
- Sizes of flue liners.
- Use of safety goggles during cutting.
- Setting flue liner.

TASK 8.08 SET FLUE

PERFORMANCE OBJECTIVE:

Given requirements for a flue, brick, mortar, and the required tools, equipment, and materials; set the flue. Bed joints between flues must be smooth, free of holes, sealed, and set in line with previous flues.

PERFORMANCE ACTIONS:

8.0801 Determine size of flue linings. (1/2 of total area of fireplace opening or 1/10 total area of multiple-opening fireplaces)

8.0802 At proper height, set flue lining over smoke chamber in center and against back of chimney, allowing expansion space, resting on corbeling.

8.0803 Set flue in mortar.

8.0804 Cut off protruding mortar inside flue lining.

8.0805 Build exterior back up walls of chimney to about 6 inches below flue lining.

8.0806 Spread mortar on top of first flue lining.

8.0807 Set second flue lining in mortar directly over first flue lining.

8.0808 Repeat step three.

8.0809 Continue this process until specified height is reached.

PERFORMANCE STANDARDS:

- Set flue linings in chimney so that bed joints between flues are smooth, free of holes, sealed and set in line with previous flues.

SUGGESTED INSTRUCTION TIME: *Integrate training task.

TASK 8.08 SET FLUE (Con't.)

RELATED TECHNICAL INFORMATION:

- Identify preferred materials used to construct flues.
- Describe advantages of round verses rectangular/square flue linings.
- Describe/demonstrate spreading mortar on flues.
- Discuss sizing of flues.
- Describe height requirements above roof.
- Discuss considerations in flue and chimney construction.

UNIT 8.0 CHIMNEYS AND FIREPLACES

TASK 8.09 TOP AND CAP CHIMNEY

PERFORMANCE OBJECTIVE:

Given specifications/requirements, brick, mortar, and tools; lay brick to cap out a chimney. Brick should be plumb, level, and straight. Put wash on chimney with proper slope so it will shed water.

PERFORMANCE ACTIONS:

8.0901	Lay brick to top out chimney.
8.0902	Provide for protecting flashing.
8.0903	Provide a sloping wash.
8.0904	Lay outside brick of chimney to 18 inches above given ridge line.
8.0905	Corbel last two courses 1/2 inch to outside for drop.
8.0906	Adjust flue liner to proper height.
8.0907	Fill inside void.
8.0908	Place mortar for wash.
8.0909	Slope wash to outside to shed water.
8.0910	Strike joints and brush work.

PERFORMANCE STANDARDS:

- Top and cap a given chimney construction so that bricks are plumb, level, and straight.
- Put wash on chimney with the proper slope so it will shed water.

SUGGESTED INSTRUCTION TIME: *Integrate training task.

UNIT 8.0 CHIMNEYS AND FIREPLACES

TASK 8.10 PREPARE CHIMNEY FOR FLASHING

PERFORMANCE OBJECTIVE:

Given flashing material, pitch, and proper tools; flash a chimney. Work must be waterproof, smooth, and tightly secured.

Orientation/demonstration task.

Typically, flashing the chimney will be the job of the carpenter: Therefore, this task is primarily orientation.

PERFORMANCE ACTIONS: (To be determined by the instructor.)

8.1001	Prepare joints for flashing.
8.1002	Cut flashing.
8.1003	Place flashing.
8.1004	Seal and secure flashing.

PERFORMANCE STANDARDS:

- Explain purpose and techniques for flashing a chimney so that the work is waterproof, smooth, and tightly secured.

SUGGESTED INSTRUCTION TIME: *Integrate training task.

RELATED TECHNICAL INFORMATION:

- Kinds of flashing.
- Cutting flashing.
- Placing flashing.
- Sealing and securing flashing.
- Using tin snips.
- Handling pitch.

TASK 8.11 LAY AN OUTER HEARTH

PERFORMANCE OBJECTIVE:

Provided with specifications/requirements for an outer hearth, brick, mortar, and the necessary tools, equipment, and materials; lay an outer hearth. The hearth must be level, square and plumb with full joints and set in a 3/8 inch mortar bed. The top of the hearth must be level with the firebox floor or inner hearth.

PERFORMANCE ACTIONS:

8.1101 Check requirements for outer hearth.

8.1102 Mark off with pencil exact distance of inner hearth.

8.1103 Lay outside course of firebricks.

8.1104 Continue laying firebrick so they are half over each other until hearth is complete.

8.1105 Place ash dump in roughed-in opening.

8.1106 Brush hearth clean.

8.1107 Restrike joints.

8.1108 Continue to build walls.

PERFORMANCE STANDARDS:

- Lay an outer hearth to requirements so the hearth is level, square, and plumb with full joints and set in a 3/8 inch mortar bed.
- Top of the hearth must be level with the firebox or inner hearth.

SUGGESTED INSTRUCTION TIME: *Integrate training task.

RELATED TECHNICAL INFORMATION:

- Identify essentials in hearth construction.
- Describe how to finish hearths.
- Identify materials for filling.
- Explain how to lay a raised hearth.
- Identify safety considerations.

UNIT 8.0 CHIMNEYS AND FIREPLACES

TASK 8.12 FINISH BACK, BOTTOM, AND SIDES OF FIREPLACE

PERFORMANCE OBJECTIVE:

Given the necessary brick, mortar, tools, and materials; lay the back, bottom, and sides of a given fireplace. The back of the fireplace must begin sloping forward from 14-16 inches above the fireplace and should fit underneath the flange and be smooth with the inside opening of the damper. The sides must be level, plumb, and straight. The bottom must be level and lain in the desired bond with the back and side walls. All joints must be 3/8 inches thick, fully filled and finished, and bonded with the back wall.

PERFORMANCE ACTIONS: (General description)

8.1201 Obtain dimensions of damper to be used.

8.1202 Mark line for base of back wall according to damper size.

8.1203 Dry bond back wall according to damper size.

8.1204 Remove dry bond and lay bricks in place, plumb, straight and level to a height of 14-16 inches, then level to fit bottom flange of damper.

8.1205 Finish joints.

8.1206 Measure depts and widths of fireplace opening.

8.1207 Dry bond front, side, and rear of fireplace.

8.1208 Lay and level fireplace bottom.

8.1209 Finish joints.

8.1210 Measure and mark sides from front to rear of fireplace opening.

8.1211 Dry bond side walls.

8.1212 Remove dry bond and lay bricks in place.

8.1213 Straighten first row of bricks.

TASK 8.12 FINISH BACK, BOTTOM, AND SIDES OF FIREPLACE

PERFORMANCE ACTIONS (Con't.):

8.1214 Lay each successive layer level, plumb, and straight.

8.1215 Finish joints.

PERFORMANCE STANDARDS:

- Finish back, bottom, and sides of fireplace so back slopes forward about 14-16 inches above fireplace and should fit underneath flange and be smooth with inside opening of damper.
- Bottom must be level and lain in desired bond with back and side walls.
- Sides must be level, plumb, and straight.
- All joints must be 3/8 inches thick, fully filled and finished, and bonded with back wall.

SUGGESTED INSTRUCTION TIME: *Integrate training task.

UNIT 8.0 CHIMNEYS AND FIREPLACES

TASK 8.13 LAY A MANTEL

PERFORMANCE OBJECTIVE:

Given specifications for a mantel, brick, mortar, and the necessary tools, equipment, and materials; lay a mantel. Each corbel must not project more than one inch and each corbeled course must be straight, level, and plumb.

PERFORMANCE ACTIONS: (General description)

8.1301 Layout mantel according to requirements/ dimensions.

8.1302 Dry bond bricks to given dimensions to establish necessary cuts.

8.1303 Lay mantel to approximately 8 inches below damper.

8.1304 Secure and set angle iron having at least 8 inches bearing.

8.1305 Lay brick across angle iron to desired height.

8.1306 Corbel as necessary for mantel shelf.

PERFORMANCE STANDARDS:

- Lay a mantel to specifications so that each corbel does not project more than one inch and each corbeled course is straight, level, and plumb.
- Mantel should be built into or firmly secured to chimney.

SUGGESTED INSTRUCTION TIME: *Integrate training task.

RELATED TECHNICAL INFORMATION:

- Explain corbeling.
- Describe various kinds of mantels.
- Describe procedure for securing mantel onto masonry.
- Identify safety considerations.

UNIT 8.0 CHIMNEYS AND FIREPLACES

TASK 8.14 (Optional, Orientation) INSTALL A HEATILATOR

PERFORMANCE OBJECTIVE:

Given specifications for a heatilator, brick, mortar, heatilator, and the necessary tools, equipment, and materials; enclose a heatilator. Insulation must completely cover the unit with masonry work without touching the unit. All work must be square, plumb, level, and straight around the heatilator.

Optional training depending upon availability of heatilator and training time. Typically, this optional task will be employed for advanced students or will be covered as an orientation task.

PERFORMANCE ACTIONS: (To be determined by instructor.)

8.1401 DEMONSTRATION:

a. Positioning the heatilator.
b. Installing grills.
c. Installing insulation.
d. Proper method of laying brick to enclose unit.

8.1402 INSTALLATION:

a. Dry bond around heatilator and across opening.
b. Lay bricks even with sides of heatilator opening and up to height of heatilator opening.
c. Secure bricks to heatilator.
d. Set lintel on top of masonry at height of opening.
e. Continue to lay bricks around heatilator and across opening.
f. Tool joints.

PERFORMANCE STANDARDS:

- Install a heatilator according to specifications so that masonry is secured to heatilator and is square, level, and plumb around heatilator.

SUGGESTED INSTRUCTION TIME: N/A

TASK 8.14 (Optional, Orientation) INSTALL A HEATILATOR (Con't.)

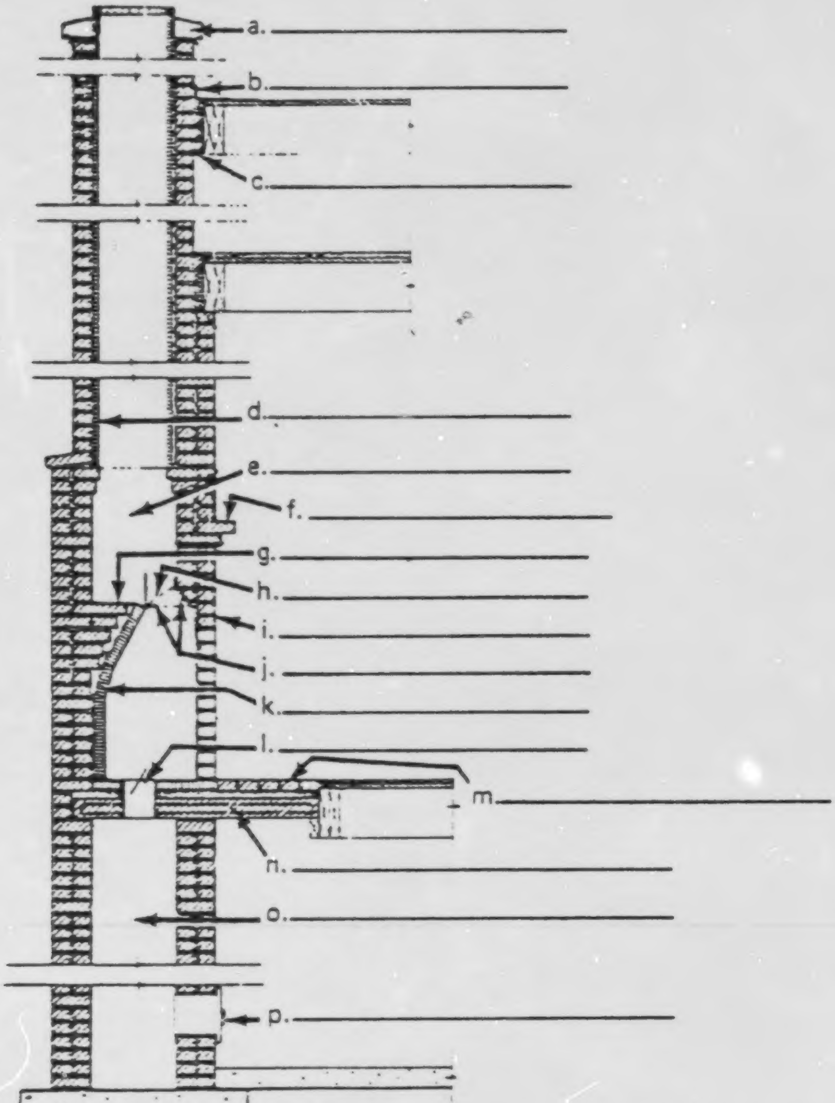
RELATED TECHNICAL INFORMATION:

- Describe purpose of heatilator.
- Identify components of a heatilator.
- Explain purpose of insulation.
- Explain advantages of using heatilators in building fireplaces.
- Describe procedure/technique for laying masonry units around heatilator.
- Identify safety considerations.

Unit 8.0

STUDENT: ______________________________ DATE: __________

1. Identify the parts of the fireplace below by writing the correct names in the blanks provided.


a. ____________________
b. ____________________
c. ____________________
d. ____________________
e. ____________________
f. ____________________
g. ____________________
h. ____________________
i. ____________________
j. ____________________
k. ____________________
l. ____________________
m. ____________________
n. ____________________
o. ____________________
p. ____________________

STUDENT: ______________________________ DATE: ____________

PERFORMANCE TEST

1. Build a chimney and fireplace

Given prints or drawing, and specifications, masonry units and mortar, and all equipment, tools, and materials needed; layout and build a chimney and fireplace with a commercially acceptable ash pit, clean-out door, rough hearth, throat, damper, smoke shelf, smoke chamber, outer hearth and finished fireplace. Cut and install flue liner, top and cap chimney and prepare chimney for flashing. If required, install a mantel. Performance process and performance must be to instructor's standards.

SUGGESTED CHECKPOINTS

A = Acceptable

( ) 1. Square chimney foundation +/- 1/16 inch of specifications.
( ) 2. Dry bonded bricks for proper mortar head joint.
( ) 3. Built ash pit according to specifications and with sufficient space for ashes for fall through and to fit a given ash dump door.
( ) 4. Installed clean-out door that was level, plumb, mounted securely with bricks behind lip of door.
( ) 5. Laid rough hearth that was level, in specified bond, with crack-free joints, not exceeding 3/8 inch in thickness.
( ) 6. Laid in ash pit in center of firebox floor so door would swing toward back of firebox when opened.
( ) 7. Set throat: Clipped header with full header top shelf leaving 1/2" expansion between firebrick and rough-in wall.
( ) 8. Installed damper which properly operates, one course of firebricks higher than lintel to front of fireplace, with smooth mortar around edges.
( ) 9. Formed smoke shelf, properly corbeled with flue lining.
( ) 10. Built smoke chamber directly under bottom of flue, with correct corbeling, with full heat joints, with chimney having proper wash slope to shed water.
( ) 11. Flue line properly cut with no breaks or cracks.
( ) 12. Flue set with smooth bed joints, free of holes, sealed and set in line with previous flues.
( ) 13. Chimney topped and capped: Brick are plumb, level and straight. Wash on chimney properly slopped for water drainage.
( ) 14. Chimney prepared for flashing.
( ) 15. Hearth and fireplace finished so work is level, square, and plumb with full joints, set in 3/8" mortar bed. Top of hearth level with firebox or inner hearth. Bottom of fireplace is level and laid in desired bond.
( ) 16. Mantel correctly installed for safety and so corbel does not project more than 1 inch and each corbeled course is straight, level, and plumb.

UNIT 9.0

BRICK CONSTRUCTION TECHNIQUES

The purpose of this unit is to prepare the secondary level brickmasonry graduate with skills important to entry level success in residential masonry construction. Many of the tasks apply to light commercial construction. Training emphasis will be on familiarization of the student with the proper terminology, an introduction to materials typically used in construction, and standard masonry practices or techniques.

BRICK CONSTRUCTION TECHNIQUES

SUGGESTED MINIMUM TERMINOLOGY

BEARING WALL	Supports loads other than its own weight.
BOND BEAM LINTEL	Reinforced lintel: Brick prepared to hold steel reinforcement rods in a layer of concrete.
CHASE	Vertical or horizontal recess in wall to conceal utilities, etc.
COLUMN	Pillar which is designed to support weight.
CORBELING	Projection of masonry units to form a shelf or ledge.
LINTEL	Horizontal member of beam support placed over a wall opening to carry weight of masonry laid over it.
PIERS	Vertical columns of masonry, not bonded to masonry wall, used to support beams, arches, porches, or where a free-standing masonry column is needed.
PILASTERS	Similar to a pier except that it is tied into the well of the structure by wall ties or bond and used to support loads, for strength, or appearance (buttresses).
STEEL BEARING PLATES (SUCH AS I-BEAMS)	Placed on piers to provide bed for steel beams or girders and spread weight over greater area.
VERNEERED WALL	Masonry wall with facing which is attached, but not bonded, to backing to act as a load-bearing wall.

MASONRY
BRICK CONSTRUCTION TECHNIQUES
SUGGESTED INSTRUCTION TIMES

MASONRY UNIT/TASK		SUGGESTED HOURS
Unit 9.0	BRICK CONSTRUCTION TECHNIQUES	
9.01	Mark Window Sill, Window, and Door Heights	6
9.02	Mark Courses to Height	18
9.03	Use Corner Pole (Use Story Pole)	6
9.04	Construct a Brick Veneer Wall	18
9.05	Lay Bricks Under Freize Board	9
9.06	Lay Rowlock Window Sill	9
9.07	Install Wall Anchors and Ties	3
9.08	Set Lintels	3
9.09	Set Window Frames	18
9.10	Set Door Frame and Anchor Door to Walls	18
9.11	Construct a Cavity Wall	15
9.12	Form a Corbel (Integrated Training Task)	15
9.13	Construct a Column and Pier	30
9.14	Construct Walls Containing Pilasters	18
9.15	Lay a Flight of Brick Steps	42
9.16	Place Expansion Joint in Masonry Wall	12
	TOTAL HOURS	240

TASK LISTINGS
MASONRY

UNIT/TASK	DESCRIPTION
Unit 9.0	BRICK CONSTRUCTION TECHNIQUES
9.01	(Mark Window Sill, Window, and Door Heights) Given a frame wall with window, a door, levelers, ruler, and pencil; locate the heights of the window sill, window, and door. Establish height marks where leads are to be built to within 1/16 inch.
9.02	(Mark Courses to Height) Given brick spacing ruler, pencil and height marks on a frame wall; mark courses to height. Select and mark courses that will best reach height marks. All marks must be equally spaced and be within +/- 1/8 inch of height point.
9.03	(Use Corner Pole [Use Story Pole]) Given instruction, specifications for a brick wall to construct, bricks and mortar, all tools, equipment, and materials; lay a 4 inch brick wall in running bond, using the corner pole (speed lead) as a guide. For story pole, place at bottom of first course and mark pole on 6 with spacing rule and all courses gaged on 6 with the story pole.
9.04	(Construct a Brick Veneer Wall) Given plans/drawings and specifications for a brick veneer wall, bricks, mortar, and the necessary tools, equipment, and materials; construct a brick veneer wall. The wall should be plumb, straight, and level, within +/- 1/16 inch of specifications for length, height, and width and have uniform joints tooled to specified finish.
9.05	(Lay Bricks Under Freize Board) Given a 1 inch by 6 inch board properly placed on a frame wall, bricks, mortar, and the necessary tools, equipment, and materials; lay bricks under the freize board. All bricks must show the same margin +/- 1/16 inch. The bricks must be crack free and fit tightly against the freize board.
9.06	(Lay Rowlock Window Sill) Given a window mounted on a frame wall, bricks, mortar, and the necessary tools, equipment, materials, and information; lay a rowlock window sill. The bricks must have at least 15 degree fall away from the window, must fit tightly under the bottom of the window, project evenly 1 1/4 inch from face of wall, and is straight, level, and plumb with uniform, crack-free head joints.

9.07 (Install Wall Anchors and Ties) Given construction plans and specifications, metals ties, and required tools, equipment, and materials; install corrugated (or other) wall ties on a veneer house (or simulation). The wall ties must be affixed to the frame wall 16 inches on center, horizontally and vertically, and fastened to the masonry wall at 90 degree angles. Wall ties must not be visible on the face side of the wall.

9.08 (Set Lintels) Provided with the necessary tools, materials, and equipment, and building specifications; set a lintel. The lintel must have a minimum bearing of 4 inches (residential brick), must be level, without resting on top of frame and plumb with the face of the wall.

9.09 (Set Window Frames) Given necessary equipment, tools, and materials, as well as instruction, building specifications and window frame; set the window frame. Sides, bottom, and top of the window must fit tightly in the window opening and the frame must stand vertically plumb and square with the wall. The window must open, close, and lock.

9.10 (Set Door Frame and Anchor Door to Walls) Given instruction, specifications for door installation, and the necessary materials, tools, and equipment; set a door frame in a masonry wall so that the sides of the frame are plumb and straight, the top of the frame is level, and the frame is braced rigidly in place.

Once the door frame is properly placed, install anchors in the door frame and build around them. The anchors must be placed at the bottom, middle, and top of the doorbuck and locked in behind flange according to specifications. The doorbuck must be level and plumb.

9.11 (Construct a Cavity Wall) Given plans and specifications for a cavity wall and the necessary materials, tools, and equipment; construct a cavity wall. The cavity wall will be built according to specifications and the cavity space must be kept clear of dropping or fallen mortar.

9.12 (Form a Corbel /Integrated Training Task/) Provided with instruction, plans and specifications, and the necessary materials, tools, and equipment; form a corbel as specified in the plans. Corbeling must be supported and in line +/- 1/8 inch.

9.13 (Construct a Column and Pier) Provided with plans and specifications for a column and pier, brick, mortar, and the necessary tools, equipment, and materials; construct the column and pier. The column and pier must be level and plumb, within +/- 1/16 inch of specifications for length, width, and height and must have uniform joints tooled to the required finish.

9.14 (Construct Walls Containing Pilasters) Following given plans and specifications and using tools, equipment, materials, brick, and mortar provided; construct a wall containing pilasters. Pilasters will be square with the face of the wall, level, and plumb within +/- 1/16 inch of specifications for length, height, and width, and have uniform joints tooled to the specified finish.

9.15 (Lay a Flight of Brick Steps) Provided with specifications for a flight of brick steps, brick, mortar, and the necessary tools, equipment, and materials; lay a flight of 3 treads brick steps. Risers should be 7 inches high and treads 12 inches wide with a 1/2 inch slope on treads to the outside of steps, away from house. Smooth treads must be level across top and joints must be free of cracks.

9.16 (Place Expansion Joint in Masonry Wall) Given expansion joint, specifications/plans, and all required materials, tools, and equipment; install the expansion joint. Mortar and pieces of masonry materials must be removed from joint and joint must be plumb and straight.

UNIT 9.0 BRICK CONSTRUCTION TECHNIQUES

TASK 9.01 MARK WINDOW SILL, WINDOW, AND DOOR HEIGHTS

PERFORMANCE OBJECTIVE:

Given a frame wall with window, a door, levelers, ruler, and pencil; locate the heights of the window sill, window, and door. Establish height marks where leads are to be built to within 1/16 inch.

PERFORMANCE ACTIONS:

9.0101 Measure vertical distance of opening above foundation to determine courses or measure distance on wall already laid, then count courses.

9.0102 Even if distance is given by print, check dimensions.

9.0103 Use story pole for locations of sill heights, tops of door, and window openings.

PERFORMANCE STANDARDS:

- Mark window sill, window, and door heights to within 1/16 inch of specifications.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Method of establishing marks to various heights.
- Modular system of locating height of window sills.

TASK 9.02 MARK COURSES TO HEIGHT

PERFORMANCE OBJECTIVE:

Given brick spacing ruler, pencil and height marks on a frame wall; mark courses to height. Select and mark courses that will best reach height marks. All marks must be equally spaced and be within +/- 1/8 inch of height point.

PERFORMANCE ACTIONS:

(To be given by instructor.)

PERFORMANCE STANDARDS:

- Mark courses to height.
- Select and mark courses will best reach height marks.
- All marks must be equally spaced and be within +/- 1/8 inch of height point.

SUGGESTED INSTRUCTION TIME: 18 Hours

RELATED TECHNICAL INFORMATION:

- Technique of coursing down.
- Identify various scaling rulers and course rods.
- Safety.

UNIT 9.0 BRICK CONSTRUCTION TECHNIQUES

TASK 9.03 USE CORNER POLE[1]
(USE STORY POLE)

PERFORMANCE OBJECTIVE:

Given instruction, specifications for a brick wall to construct, bricks and mortar, all tools, equipment, and materials, lay a 4 inch brick wall in running bond, using the corner pole (speed lead) as a guide.

For story pole, place at bottom of first course and mark pole on 6 with spacing rule and all courses gaged on 6 with the story pole.

PERFORMANCE ACTIONS:

9.0301 Mix mortar.

9.0302 Stock materials in work area and load mortar pans.

9.0303 Strike a chalk line approximately 11 feet long on the shop floor to act as the wall line.

9.0304 Set up the corner poles at each end of the chalk line. Plumb and brace them into position with the wall line.

9.0305 Dry bond the first course which is 12 bricks in length.

9.0306 Attach the line and blocks to the corner pole at the height of the first course.

9.0307 Lay the first course in the mortar.

9.0308 Move the line up 1 course.

9.0309 Cut bats for the second course and finish laying the course as shown on the plan.

9.0310 Build the wall to the required height as shown on the plan, plumbing jams (wall ends) on every course.

9.0311 Strike the mortar joints with a convex sled runner jointer and brush.

9.0312 Recheck the wall with a level (plumb rule) at the completion of the work.

UNIT 9.0 BRICK CONSTRUCTION TECHNIQUES

TASK 9.03 USE CORNER POLE[1]
(USE STORY POLE)

PERFORMANCE ACTIONS (Con't.):

9.0313 FOR STORY POLE:

a. Obtain straight wood for story pole.
b. Mark story pole with selected gage to be used.
c. Place story pole in given position at corner of wall.
d. Gage courses at marks on story pole.

PERFORMANCE STANDARDS:

- Lay a 4 inch brick wall in running bond, using the corner pole as a guide.
- Wall must be to required height, plumb, level, jointed, and brushed to the instructor's standards.

SUGGESTED INSTRUCTION TIME: 6 Hours

RELATED TECHNICAL INFORMATION:

- Identify some types of corner poles.
- Describe positioning of corner poles.
- Tell how to check for plumb.
- Explain the productivity value of using corner poles.

RATING SCALE
LAYOUT AND USE OF STORY POLE AND GAGE STICK

YES	NO	
( )	( )	1. Proper length.
( )	( )	2. Proper thickness.
( )	( )	3. Proper width.
( )	( )	4. Proper markings for brick or block.
( )	( )	5. Window height.
( )	( )	6. Door sill markings.
( )	( )	7. Doors.
( )	( )	8. Window sills.

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[1] Task adopted from: Kreh, R. T., Sr., Masonry Skills, Albany, NY: Delmar Publishers Inc., pp. 118-119, 1982.

TASK 9.04 CONSTRUCT A BRICK VENEER WALL

PERFORMANCE OBJECTIVE:

Given plans/drawings and specifications for a brick veneer wall, bricks, mortar, and the necessary tools, equipment, and materials; construct a brick veneer wall. The wall should be plumb, straight, and level, within +/- 1/16 inch of specifications for length, height, and width and have uniform joints tooled to specified finish.

PERFORMANCE ACTIONS:

9.0401 Review plans and specifications.

9.0402 Assemble required brick.

9.0403 Bond wall.

9.0404 Scale each course.

9.0405 Lay brick in mortar to scale.

9.0406 Secure wall with metal wall ties every 6th course of veneer wall 2 feet apart.

PERFORMANCE STANDARDS:

- Construct a brick veneer wall to plans and specifications so that the wall is plumb, straight, and level, within +/- 1/16 inch of specifications for length, height, and width, with uniform joints tooled to specified finish.
- The wall will be free of cracks and holes.

SUGGESTED INSTRUCTION TIME: 18 Hours

RELATED TECHNICAL INFORMATION:

- Identify types of brick.
- Identify types of wall patterns and wall construction.
- Explain purpose of weep holes.
- Describe how to use speed leads (Corner poles).
- Explain purpose of vibration joint.
- Identify generally accepted methods for laying brick veneer wall against frame construction.
- Describe types of ties used to secure walls.
- Identify safety considerations.

TASK 9.05 LAY BRICKS UNDER FREIZE BOARD

PERFORMANCE OBJECTIVE:

Given a 1 inch by 6 inch board properly placed on a frame wall, bricks, mortar, and the necessary tools, equipment, and materials; lay bricks under the freize board. All bricks must show the same margin +/- 1/16 inch. The bricks must be crack free and fit tightly against the freize board.

PERFORMANCE ACTIONS:

9.0501 Lay bricks under freize board following instructor's recommended techniques.

PERFORMANCE STANDARDS:

- Lay bricks under freize board so that all bricks show same margin +/- 1/16 inch and so bricks are crack free and fit tightly against the freize board.

SUGGESTED INSTRUCTION TIME: 9 Hours

RELATED TECHNICAL INFORMATION:

- Explain purpose of soldiers under freize board.
- Describe procedures for laying bricks under freize boards.
- Identify safety considerations.

UNIT 9.0	BRICK CONSTRUCTION TECHNIQUES
TASK 9.06	LAY ROWLOCK WINDOW SILL

PERFORMANCE OBJECTIVE:

Given a window mounted on a frame wall, bricks, mortar, and the necessary tools, equipment, materials, and information; lay a rowlock window sill. The bricks must have at least 15 degree fall away from the window, must fit tightly under the bottom of the window, project evenly 1 1/4 inch from face of wall, and is straight, level, and plumb with uniform, crack-free head joints.

PERFORMANCE ACTIONS:

9.0601 Install flashing.

9.0602 Determine projection and desired fall.

9.0603 Cut brick to desired projection and fall.

9.0604 Course window sill to determine amount of brick needed.

9.0605 Spread mortar on masonry under bottom of window where sill is to be laid.

9.0606 Lay sill in place on courses.

9.0607 Tool joints.

9.0608 Remove excess mortar from sill.

PERFORMANCE STANDARDS:

- Lay rowlock window sill that has at least 15 degree fall away from window, fits tightly under the bottom of the window, projects evenly 1 1/4 inch from face of wall, and is straight, level, and plumb with uniform, crack-free head joints.

SUGGESTED INSTRUCTION TIME: 9 Hours

RELATED TECHNICAL INFORMATION:

- Identify different types of sills.
- Explain use and purpose of flashing.
- Demonstrate techniques for cutting window sill bricks.
- Describe procedure for laying brick at an angle in constructing window sills.
- Identify safety considerations.

UNIT 9.0 BRICK CONSTRUCTION TECHNIQUES

TASK 9.07 INSTALL WALL ANCHORS AND TIES

PERFORMANCE OBJECTIVE:

Given construction plans and specifications, metal ties, and required tools, equipment, and materials; install corrugated (or other) wall ties on a veneer house (or simulation). The wall ties must be affixed to the frame wall 16 inches on center, horizontally and vertically, and fastened to the masonry wall at 90 degree angles. Wall ties must not be visible on the face side of the wall.

PERFORMANCE ACTIONS:

9.0701 Measure 16 inches vertically from starting point to frame structure on each end and mark.

9.0702 Place chalk line horizontally on vertical measurements and chalk.

9.0703 Space and affix wall ties on horizontal line 16 inches on center.

9.0704 Continue to space and affix wall ties 16 inches on center both vertically and horizontally.

9.0705 When wall reaches wall ties, bend ties on top of masonry at 90 degree angles.

9.0706 Continue to build wall and follow same procedure as each wall tie height is reached.

PERFORMANCE STANDARDS:

- Install wall anchors and ties on a veneer house (or simulation).
- The ties must be affixed to the frame wall 16 inches on center horizontally and vertically and fastened to the masonry wall at 90 degree angles.
- The installed wall ties must not be visible on the face side of the wall.

SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Identify wall ties and anchors.
- Explain purpose of drip in Z ties.
- Identify the advantage of staggering ties.
- Describe/demonstrate how to nail ties to wood frame.
- Identify safety considerations.

TASK 9.08 SET LINTELS

PERFORMANCE OBJECTIVE:

Provided with the necessary tools, materials, and equipment, and building specifications; set a lintel. The lintel must have a minimum bearing of 4 inches (residential brick), must be level, not resting on top of frame, and plumb with the face of the wall.

PERFORMANCE ACTIONS:

9.0801	Build wall to allow a minimum of 4 inches bearing across top of opening on both sides.
9.0802	Spread a solid bed of mortar where lintel is to be set.
9.0803	Raise wedge and set lintel in mortar of 4 inch bearings.
9.0804	Level lintel.
9.0805	Plumb lintel with face to wall.
9.0806	Finish joints.

PERFORMANCE STANDARDS:

- Set lintels according to specifications so that a minimum bearing across top of opening on both sides is maintained.
- The lintel must be level, not resting on top of the frame, and plumb with the face of the wall.

SUGGESTED INSTRUCTION TIME: 3 Hours

RELATED TECHNICAL INFORMATION:

- Determine the proper bearing of jambs.
- Identify common kinds of lintels.
- Describe/demonstrate how to level a lintel.
- Describe how to install a steel lintel.
- Describe how to install a concrete block lintel.
- Describe how to install a bond beam lintel (reinforced lintel).

UNIT 9.0 BRICK CONSTRUCTION TECHNIQUES

TASK 9.09 SET WINDOW FRAMES

PERFORMANCE OBJECTIVE:

Given necessary equipment, tools, and materials, as well as instruction, building specifications and window frame; set the window frame. Sides, bottom, and top of the window must fit tightly in the window opening and the frame must stand vertically plumb and square with the wall. The window must open, close, and lock.

PERFORMANCE ACTIONS:

9.0901 Measure size of the window.

9.0902 Layout window according to specified dimensions.

9.0903 Build window jamb up to height of lintel using sash end blocks.

9.0904 Slide window in sash end blocks from top down.

9.0905 Place lintel horizontally across top of window opening.

9.0906 Shove window upward and tight against bottom of lintel and wedge.

9.0907 Install flashing as required.

9.0908 Lay window sill tightly to bottom of window.

PERFORMANCE STANDARDS:

- Set window frame according to specifications so that the sides, bottom, and top of the window fit tightly in the opening and the frame stands vertically plumb and square with the wall.
- The installed window must open, close, and lock properly.

SUGGESTED INSTRUCTION TIME: 18 Hours

RELATED TECHNICAL INFORMATION:

- Describe layout procedures.
- Describe care in handling window frames/units.
- Describe installation steps.
- Identify safety considerations.

UNIT 9.0 BRICK CONSTRUCTION TECHNIQUES

TASK 9.10 SET DOOR FRAME AND ANCHOR DOOR TO WALLS

PERFORMANCE OBJECTIVES:

Given instruction, specifications for door installation, and the necessary materials, tools, and equipment; set a door frame in a masonry wall so that the sides of the frame are plumb and straight, the top of the frame is level, and the frame is braced rigidly in place.

Once the door frame is properly placed, install anchors in the door frame and build around them. The anchors must be placed at the bottom, middle, and top of the doorbuck and locked in behind flange according to specifications. The doorbuck must be level and plumb.

PERFORMANCE ACTIONS: (If metal door frame is not available, wood frame may be substituted.)

(NOTE: Actions 1-4 typically will be accomplished by a carpenter.)

9.1001 Assemble door frame and materials required for installation.

9.1002 Tie door frame to wall.

9.1003 Brace door frame.

9.1004 Place struts in frame.

9.1005 Check placement of door.

9.1006 Turn anchor to 45 degree angle within door buck.

9.1007 Press flat within flange and on top of masonry work.

9.1008 Fill door buck solid with mortar or other masonry material.

PERFORMANCE STANDARDS:

- Set door and anchor door to walls so sides of frame are plumb and straight, top of frame is level, and frame is braced rigidly in place.

TASK 9.10 SET DOOR FRAME AND ANCHOR DOOR TO WALLS

PERFORMANCE STANDARDS (Con't.):

- Anchors must be placed at bottom, middle, and top of doorbuck and locked in behind flange according to specifications with doorbuck level and plumb.

SUGGESTED INSTRUCTION TIME: 18 Hours

RELATED TECHNICAL INFORMATION:

- Identify common types of door frames.
- Describe how to tie door frame to wall.
- Explain how to brace door frame.
- Describe how to place struts in frame.
- Demonstrate how to level, wedge, and brace.
- Describe types of anchors.
- Explain how to place anchors in door frames.
- Explain how to build around door frames.

EXPANSION OF TASK:

- Describe/demonstrate how to lay brick to doorbucks installed ahead of wall.

TASK 9.11 CONSTRUCT A CAVITY WALL

PERFORMANCE OBJECTIVE:

Given plans and specifications for a cavity wall and the necessary materials, tools, and equipment; construct a cavity wall. The cavity wall will be built according to specifications and the cavity space must be kept clear of dropping or fallen mortar.

(NOTE: This task may be demonstration or competency: Indicate on the "Proficiency Report.")

PERFORMANCE ACTIONS:

9.1101 Determine width of cavity and type of brick.

9.1102 Bond wall, allowing for cavity.

9.1103 Scale each course to desired height.

9.1104 Lay brick in mortar to scale:

- a. Construct two tiers of masonry units (brick or brick and block) to form a cavity wall separated by a minimum of 2 inches (cavity will be specified by instructor or plans).
- b. Provide flashing called for in specifications or by instructor or provide weep holes as specified.
- c. Demonstrate methods of keeping cavity free of excess mortar.

9.1105 Secure wall with ties at desired intervals.

9.1106 Point and joint wall.

PERFORMANCE STANDARDS:

- Construct a cavity wall to specifications keeping the cavity space free of dropping or fallen mortar.

SUGGESTED INSTRUCTION TIME: 15 Hours

RELATED TECHNICAL INFORMATION:

- Describe uses of cavity walls.
- Describe purpose of flashing and weep holes.
- Explain through wall bonding.
- Describe how to use metal ties.
- Describe considerations in insulating a cavity wall.

UNIT 9.0 BRICK CONSTRUCTION TECHNIQUES

TASK 9.12 FORM A CORBEL
(INTEGRATED TRAINING TASK)

PERFORMANCE OBJECTIVE:

Provided with instruction, plans and specifications, and the necessary materials, tools, and equipment; form a corbel as specified in the plans. Corbeling must be supported and in line +/- 1/8 inch.

PERFORMANCE ACTIONS:

9.1201 Determine total projection from wall.

9.1202 Determine how much each projection must extend.

9.1203 Lay first corbel course.

9.1204 Complete first course, filling in space between corbel and wall.

9.1205 Lay remaining courses according to plan tying as needed.

9.1206 Joint and point corbel.

PERFORMANCE STANDARDS:

- Corbel bricks to form a decorative appearance with corbeling not extending more than 1/2 of the thickness of the wall or 1/2 the units height or 1/3 the bed height.
- Corbeling should be free from chips or cracks, bricks must be level and plumb, and mortar joints must be well-filled and properly finished.

SUGGESTED INSTRUCTION TIME: 15 Hours

RELATED TECHNICAL INFORMATION:

- Discuss corbeling and its uses.
- Describe proper way of supporting corbeled bricks.

TASK 9.13 CONSTRUCT A COLUMN AND PIER

PERFORMANCE OBJECTIVE:

Provided with plans and specifications for a column and pier, brick, mortar, and the necessary tools, equipment, and materials; construct the column and pier. The column and pier must be level and plumb, within +/- 1/16 inch of specifications for length, width, and height and must have uniform joints tooled to the required finish.

PERFORMANCE ACTIONS:

9.1301 A (CONSTRUCT PIER)

(1) Dimension, square, and mark area for pier.
(2) Lay corner masonry unit in mortar and level.
(3) Lay remaining masonry units in first course level and straightedge.
(4) Lay corner masonry units in reverse direction on top of first course.
(5) Lay remaining units in course level and straightedge.
(6) Continue to reverse corner units and lay courses to desired height.
(7) Tool joints.

9.1301 B (BUILD COLUMNS)

(1) Determine size of column (may be combined with above task).
(2) Square column.
(3) Dry bond and mark joints of column.
(4) Remove dry bonded bricks.
(5) Lay bricks in mortar; level and square first course.
(6) Level and plumb each additional course.

PERFORMANCE STANDARDS:

- Construct a pier to specifications and so it is square, level, plumb, and straightedged, jointed and free of cracks and holes.
- Build a column to specifications and so it is plumb, straight, and level.

SUGGESTED INSTRUCTION TIME: 30 Hours

280

TASK 9.13 CONSTRUCT A COLUMN AND PIER (Con't.)

RELATED TECHNICAL INFORMATION:

- Differentiate (explain difference) between columns and piers.
- Define term "bat" as used in constructing a column (See related task in first year objectives: "Cut a bat closure").
- Describe procedures for laying out and building columns and piers: Square, rectangular, etc.
- Use of short level for first 6 courses and plumb rule for other courses.
- Procedure for keeping surplus mortar from the interior of the pier.

EXPANSION OF TASK:

- "Build square and rectangular brick columns to specifications."
- "Build corner brick columns."
- "Cut a bat closure" (additional training).

UNIT 9.0 BRICK CONSTRUCTION TECHNIQUES

TASK 9.14 CONSTRUCT WALLS CONTAINING PILASTERS

PERFORMANCE OBJECTIVE:

Following given plans and specifications and using tools, equipment, materials, brick, and mortar provided; construct a wall containing pilasters. Pilasters will be square with the face of the wall, level, and plumb within +/- 1/16 inch of specifications for length, height, and width, and have uniform joints tooled to the specified finish.

PERFORMANCE ACTIONS:

9.1401 Following instructor's recommended procedures, construct pilasters in garden or retaining walls.

PERFORMANCE STANDARDS:

- Construct walls containing pilasters that are square with the face of the wall, level and plumb within +/- 1/16 inch of specifications for length, width, and height, and that have uniform joints tooled to specifications.

SUGGESTED INSTRUCTION TIME: 18 Hours

RELATED TECHNICAL INFORMATION:

- Describe difference between pilasters and columns.
- Describe procedure for bonding pilasters in walls.

UNIT 9.0 BRICK CONSTRUCTION TECHNIQUES

TASK 9.15 LAY A FLIGHT OF BRICK STEPS

PERFORMANCE OBJECTIVE:

Provided with specifications for a flight of brick steps, brick, mortar, and the necessary tools, equipment, and materials; lay a flight of 3 treads brick steps. Risers should be 7 inches high and treads 12 inches wide with a 1/2 inch slope on treads to the outside of steps, away from house. Smooth treads must be level across top and joints must be free of cracks.

PERFORMANCE ACTIONS: (Stretcher and rowlock combination steps.)

9.1501 Layout outside of steps according to plans.

9.1502 Establish a level point on a stake near outside edge of first tread.

9.1503 Layout first stretcher course of brick as shown on plan.

9.1504 Fill in behind stretcher course with rough brick as shown on plan.

9.1505 Lay 3 rowlock bricks level with each other on each end of stretcher course. Project them out 1/2 inch over course below and slope bricks 1/4 in./ft. to drain water. (Solid brick on end of tread.)

9.1506 Attach to front edge of bricks and fill in between.

9.1507 Lay another rowlock brick behind first one to complete the tread.

9.1508 Behind tread on outsides of step, lay rowlock header back to porch wall. Fill in hollow portion behind rowlocks.

9.1509 Measuring back from edge of tread, mark off 12 inch line. (All the way across step.)

9.1510 Lay second step repeating earlier technique.

9.1511 Lay third step, cutting and laying a half brick (bat) rowlock behind first rowlock to form the 12 inch tread.

PERFORMANCE ACTIONS (Con't.):

9.1512 Point up any holes with mortar. Tool mortar joints with large convex jointer when joints are about thumbprint hard.

9.1513 Brush steps of lightly when they are dry enough not to smear.

PERFORMANCE STANDARDS:

- Lay a flight of 3 tread brick steps with risers 7 inches high and treads 12 inches wide with 1/2 inch (or 1/4 in./ft.) slope on treads to outside of steps, away from house.
- Treads must be smooth and level across top and joints must be free of cracks.

SUGGESTED INSTRUCTION TIME: 42 Hours

RELATED TECHNICAL INFORMATION:

- Describe a good foundation for step building (concrete).
- Describe procedure for pouring a concrete base for steps.
- Describe procedures for figuring number of steps and determining the starting point: 7 x 11, 7 x 11 1/2, 7 x 12.
- Explain importance of uniform height and depth of risers and treads.
- Explain reasons for sloping treads.
- Describe procedures for laying various types of steps.
- Distinguish between: Stretcher and header and stretcher and rowlock combination brick steps.
- Describe how to project rowlock bricks about 1/2 inch to form water drip.

UNIT 9.0 BRICK CONSTRUCTION TECHNIQUES

TASK 9.16 PLACE EXPANSION JOINT IN MASONRY WALL

PERFORMANCE OBJECTIVE:

Given expansion joint, specifications/plans, and all required materials, tools, and equipment; install the expansion joint. Mortar and pieces of masonry material must be removed from joint and joint must be plumb and straight.

PERFORMANCE ACTIONS:

9.1601 Install expansion joint in given masonry wall.

PERFORMANCE STANDARDS:

- Place expansion joint in masonry wall so mortar and pieces of masonry material are removed from joint, joint is plumb and straight, and finished installation meets instructor's standards.

SUGGESTED INSTRUCTION TIME: 12 Hours

RELATED TECHNICAL INFORMATION:

- Describe kinds of expansion joints.
- Identify uses of expansion joints.
- Determine kind of expansion joint from blueprint.
- Determine place in wall for expansion joint.
- Describe/demonstrate how to keep joint straight and plumb.
- Demonstrate how to remove excess mortar from expansion joint.

Unit 9.0

STUDENT: ______________________________ DATE: ____________

PERFORMANCE TESTS:

1. Mark courses to height

Given brick spacing ruler, pencil, and height marks on a frame wall; select and mark courses to best reach height marks with all marks equally spaced and within +/- 1/8 inch of height points. This task must be accomplished in the time allocated and performance must be to the instructor's standards.

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

2. Mark window sill, window, and door heights

Given a frame wall with window, door, levelers, ruler, and pencil; locate heights of window sill, window, and door within 1/16 inch of specifications given. Make and mark a story pole for the locations of sill heights, top of door, and window openings.

CHECKLIST FOR EVALUATION

	Yes	No
1. Window sill height marked properly.	( )	( )
2. Window height marked properly.	( )	( )
3. Door height marked properly.	( )	( )
4. Story pole set up properly.	( )	( )

3. Construct brick veneer wall

Given plans or a drawing and specifications for a brick veneer wall, bricks, mortar, and the necessary tools, equipment, and materials; construct a brick veneer wall. The wall must be plumb, straight, and level, within +/- 1/16 inch of specifications for length, height, and width and have uniform joints tooled to specified finish. Lay rowlock window sill with 15 degree fall from window to standards of course description. Bricks should fit tightly against freize board. The finished wall must be free of cracks and holes and must meet the instructor's standards.

PERFORMANCE CHECKLIST

YES	NO		
( )	( )	1.	Reviewed plans and specifications before starting.
( )	( )	2.	Properly assembled all materials prior to beginning work.
( )	( )	3.	Used correct procedures in bonding wall.
( )	( )	4.	Scaled each course accurately and to instructor's standards.
( )	( )	5.	Laid brick in mortar to scale.
( )	( )	6.	Secured wall with metal wall ties.
( )	( )	7.	Proper use of weep holes.
( )	( )	8.	Proper techniques used in laying brick veneer against frame structure (water protection, etc.).
( )	( )	9.	Performance to instructor's standards.
( )	( )	10.	Product to instructor's standards.
( )	( )	11.	Laid bricks under freize board to standards of the instructor.
( )	( )	12.	Cut bricks to desired projection and fall.
( )	( )	13.	Laid sill on courses, with proper fall, to instructor's standards.
( )	( )	14.	Properly tooled joints.

MULTIPLE CHOICE:

Select the most correct answer from those choices provided and indicate your answer in the space provided.

1. The recommended spacing for brick veneer from the exterior framing of an existing wall to the face of the brick work is ____ inches.

   a. 4
   b. 4.5
   c. 5
   d. 6

2. The recommended mortar to use when masonry work for brick veneer is in contact with the earth is ____.

   a. N
   b. O
   c. M
   d. S

3. The recommended mortar for above grade masonry work is ____.

   a. N
   b. M
   c. O
   d. S

4. The correct spacing in height for wall ties to be fastened to framing to tie a veneer wall to a frame structure is ____ inches.

   a. 12
   b. 16
   c. 18
   d. 24

5. The correct spacing for weep holes to be placed in the head joints just above grade line to drain moisture from a veneered wall is ____ apart.

   a. 16
   b. 24
   c. 36
   d. 48

6. Fasten wall ties to studding with ____ size nails.

   a. 4d
   b. 6d
   c. 8d
   d. 12d

COMPLETE THE FOLLOWING STATEMENTS BY FILLING IN THE ONLY CORRECT WORD THAT WILL MAKE THE STATEMENT CORRECT.

7. To ensure that there are no obstructions, a __________ line is established for the brick work from the footing to the top plate before any bricks are laid in veneer construction.

8. The greatest enemies of masonry work are changes of temperature and __________ penetration.

9. In building a veneer wall, the footing should be located below the __________ line.

10. Brick veneering is considered to improve the appearance of an old structure. It also is considered to __________ the structure.

PERFORMANCE TESTS:

1. Form a corbel

Provided with plan or drawing and specifications, and the necessary tools, equipment and materials; corbel bricks to form a decorative appearance with corbeling not extending more than 1/2 of the thickness of the wall or 1/2 the units height of 1/3 the bed height. Corbeling must be free from chips or cracks, bricks must be level and plumb, and mortar joints must be well-filled and properly finished.

PERFORMANCE CHECKLIST

A	N	
( )	( )	1. Determined total projection from wall.
( )	( )	2. Determined how much each projection must extend.
( )	( )	3. Laid first corbel course correctly.
( )	( )	4. Properly tied in courses.
( )	( )	5. Corbeled bricks to specifications.
( )	( )	6. Jointed and pointed corbel.
( )	( )	7. Met instructor's performance standards.
( )	( )	8. Met instructor's product standards.

A = Acceptable

N = Not acceptable

2. Construct a column and pier

Given plans and specifications for a column and pier, brick and mortar, and the necessary tools, equipment, and materials; construct the column and pier to specifications within +/- 1/16 inch for length, width, and height, with uniform joints and to the required finish. The pier must be square, level, plumb, and straightedged, properly jointed and free of cracks and holes.

PERFORMANCE CHECKLIST

A	N		
( )	( )	1.	Area properly marked for pier, dimensioned and square.
( )	( )	2.	Proper dry bonding technique used.
( )	( )	3.	First course leveled and straightedged.
( )	( )	4.	Bat closure properly cut, if applicable.
( )	( )	5.	Length to specifications.
( )	( )	6.	Width to specifications.
( )	( )	7.	Height to specifications.
( )	( )	8.	Square.
( )	( )	9.	Plumb.
( )	( )	10.	Straightedge.
( )	( )	11.	Properly jointed.
( )	( )	12.	Free of cracks and holes.
( )	( )	13.	Surplus mortar keep from interior of pier.

A = Acceptable
N = Not acceptable

3. Construct wall containing pilasters

Given plan and specifications, bricks and mortar, and all equipment, tools, and materials needed; construct a wall containing pilasters that are square and with the face of the wall, level and plumb within +/- 1/16 inch of specifications for length, width, and height, and that have uniform joints tooled to specifications.

PERFORMANCE CHECKLIST

A	N		
( )	( )	1.	Plan an specifications properly interpreted.
( )	( )	2.	Equipment, tools, materials properly assembled.
( )	( )	3.	Layout.
( )	( )	4.	Spreading mortar.
( )	( )	5.	Level.
( )	( )	6.	Plumb.
( )	( )	7.	Straight.
( )	( )	8.	To line.
( )	( )	9.	Workmanship.
( )	( )	10.	Use of tools.
( )	( )	11.	Cleaned and replaced tools.
( )	( )	12.	Completeness of job.
( )	( )	13.	Cleaned up working area.
( )	( )	14.	Knowledge of assignment.
( )	( )	15.	Attitude toward assignment.
( )	( )	16.	Proper use of wall ties, if applicable.
( )	( )	17.	Pilaster extends from brick wall properly.
( )	( )	18.	Met instructor's standards for performance.
( )	( )	19.	Met instructor's standards for product.

A = Acceptable
N = Not acceptable

MULTIPLE CHOICE:

From the choices given, select the most appropriate answer and indicate your choice in the space provided.

1. The top surface of a porch is called the _____.

   a. tread
   b. run
   c. platform
   d. stoop

2. The part of the step a person steps on is called the _____.

   a. tread
   b. riser
   c. stoop
   d. run

3. The vertical part of the step is called the _____.

   a. tread
   b. riser
   c. run
   d. elevation

4. The standard height for a stretcher and rowlock brick step is _____ inches.

   a. 5 1/2
   b. 6
   c. 7
   d. 8

5. The depth of a brick step should be no less than _____ inches.

   a. 8
   b. 10
   c. 12
   d. 16

6. The correct projection for the top tread brick is _____ inches.

   a. 1/4
   b. 1/2
   c. 3/4
   d. 1

7. To drain water from the step, the step should slope to the front on a ratio of _____ inch to the foot.

   a. 1/8
   b. 1/4
   c. 1/2
   d. 3/4

8. When dry bonding brick, the recommended mortar head joint is _____ inch.

   a. 1/2
   b. 3/4
   c. 3/8
   d. 5/8

9. The best mortar joint for finishing the top of brick steps is the _____ joint.

   a. V-joint
   b. convex
   c. raked
   d. concave

10. While steps may vary in length depending on the size of the sidewalk that leads to them, the typical length (side to side) is _____ feet.

   a. 3
   b. 3.5
   c. 4
   d. 4.5

PERFORMANCE TEST:

1. Lay a flight of brick steps

Given specifications for a flight of brick steps or a situation requiring steps to be built, brick and mortar, and the necessary equipment, tools, and materials; lay a flight of brick steps with 7 inches high risers and 12 inches wide treads with 1/4 - 1/2 inch per foot slope on treads to outside of steps, away from the house. Treads must be smooth and level across the top and joints must be free of cracks.

CHECKLIST FOR PERFORMANCE EVALUATION

A	N		
☐	☐	1.	Layout properly done, measurements correct.
☐	☐	2.	Dry bond properly done.
☐	☐	3.	Mortar spread properly, full mortar joints.
☐	☐	4.	Height of risers and width of tread checked before next step built.
☐	☐	5.	Proper 1/4 - 1/2 slope/ft. on treads for drainage.
☐	☐	6.	Treads smooth and level across top.
☐	☐	7.	Joints free of cracks and finished properly.
☐	☐	8.	Use of tools.
☐	☐	9.	Cleaned and replaced tools.
☐	☐	10.	Workmanship.
☐	☐	11.	Completeness of job.
☐	☐	12.	Cleaned up working area.
☐	☐	13.	Knowledge of assignment.
☐	☐	14.	Attitude toward work assignment.
☐	☐	15.	Met instructor's standards for performance.
☐	☐	16.	Met instructor's standards for product.

A = Acceptable
N = Not acceptable

UNIT OMITTED

CONCRETE BLOCK CONSTRUCTION

Concrete block construction has been omitted from this Articulated, Performance-based Instruction Guide for Masonry because there is less emphasis at the secondary level in block construction and because the tasks are very similar to the tasks found in Unit 9.0, Brick Construction Techniques.

By adjusting the specifications, standards, and descriptions, the instructor could use the Brick Construction Techniques unit as a guide to competencies in Concrete Block Construction.

If instructional time, budget, and materials or if a need encourages instruction in concrete block construction, the following objectives may serve as a starting point.

CONCRETE BLOCK CONSTRUCTION MINIMUM TASKS

1. Construct a story pole for a concrete masonry wall.
2. Layout and bond doors and windows.
3. Construct a reinforced block wall.
4. Install wall anchors and ties.
5. Install expansion joints.
6. Install flashing.
7. Set lintels.
8. Set coping.
9. Underpin a building.
10. Construct a wall containing pilasters.

UNIT 10.0

CONCRETE MASONRY

Tasks described in this unit are based on the following publications:

Daizell, J. Ralph, and Gilbert Townsend, Masonry Simplified, Alsip, IL: American Technical Publishers, Inc., 1973.

Kreh, R. T. Sr., Masonry Skills, Albany, NY: Delmar Publishers Inc., 1982.

Kreh, R. T. Sr., Advanced Masonry Skills, Albany, NY: Delmar Publishers Inc., 1978.

White, George R., Concrete Technology, Albany, NY: Delmar Publishers Inc., 1977.

MASONRY
CONCRETE MASONRY
SUGGESTED INSTRUCTION TIMES

MASONRY UNIT/TASK		SUGGESTED HOURS
Unit 10.0	CONCRETE MASONRY	
10.01	Estimate Concrete for Slab (Flat Work)	*
10.02	Build Forms for Concrete Flat Work	*
10.03	Pour and Finish a Concrete Sidewalk	*
10.04	Pour and Finish a Concrete Slab	*
	TOTAL HOURS	30

*Instructional planning time is summarized for the unit since tasks are learned as a continuous process rather than on a task by task basis.

TASK LISTINGS
MASONRY

UNIT/TASK	DESCRIPTION
Unit 10.0	CONCRETE MASONRY
10.01	(Estimate Concrete for Slab [Flat Work]) Estimate the amount of concrete required for a concrete slab based on the given size including depth and dimensions. The estimate must not exceed 10 percent of a predetermined amount.
10.02	(Build Forms for Concrete Flat Work) Given plans and specifications for a concrete slab, rough lumber, and the necessary tools, equipment, and materials; build forms for concrete flat work. The forms must be constructed securely, built within 1/8 inch of specifications and be level, plumb, and straight.
10.03	(Pour and Finish a Concrete Sidewalk) Given plans and specifications for concrete sidewalk, the necessary forms, premixed concrete, and the necessary tools, equipment, and materials; pour and finish a concrete sidewalk. The finished concrete must be level with the forms with the specified finish.
10.04	(Pour and Finish a Concrete Slab) Given plans and specifications for a concrete slab, premixed concrete to specifications, and the necessary tools, equipment, and materials; pour and finish a concrete slab. The concrete must be to the proper level and finished with a slick finish.

UNIT 10.0 CONCRETE MASONRY

TASK 10.01 ESTIMATE CONCRETE FOR SLAB (FLAT WORK)

PERFORMANCE OBJECTIVE:

Estimate the amount of concrete required for a concrete slab based on the given size including depth and dimensions. The estimate must not exceed 10 percent of a predetermined amount.

PERFORMANCE ACTIONS:

10.0101 Given a concrete computer or formular, estimate amount of concrete needed to pour flat work.

PERFORMANCE STANDARDS:

- Estimate amount of concrete required for a slab of given dimensions and depth with estimate not exceeding predetermined amount by more than 10 percent.

SUGGESTED INSTRUCTION TIME: *Integrated training task.

RELATED TECHNICAL INFORMATION:

- Explain method of estimating concrete.
- Demonstrate how to use given formular for calculating volumes of various shapes and sizes.

UNIT 10.0 CONCRETE MASONRY

TASK 10.02 BUILD FORMS FOR CONCRETE FLAT WORK

(NOTE: Typically this task will be accomplished by the carpenter; however, the mason should be able to perform the task if required. Training may be orientation and accomplished jointly with carpentry instruction.)

PERFORMANCE OBJECTIVE:

Given plans and specifications for a concrete slab, rough lumber, and the necessary tools, equipment, and materials; build forms for concrete flat work. The forms must be constructed securely, built within 1/8 inch of specifications and be level, plumb, and straight.

PERFORMANCE ACTIONS: (To be determined by concrete job.)

10.0201 Install vertical supports.

10.0202 Install sheathing or wood frame.

10.0203 Install wales to hold sheathing in line.

10.0204 Install ties, as required.

10.0205 Install braces, as required.

10.0206 Cure concrete.

PERFORMANCE STANDARDS:

- Build forms for concrete flat work.
- The finished forms must be constructed securely, built within 1/8 inch of specifications and be level, plumb, and straight.
- The forms must be able to withstand the potential pressure to which they will be exposed.

SUGGESTED INSTRUCTION TIME: *Integrated training task.

RELATED TECHNICAL INFORMATION:

- Identify and describe various types of forms used in concrete flat work.
- Identify (distinguish) appropriate nails for building forms.
- Describe various methods used to brace forms.

UNIT 10.0	CONCRETE MASONRY
TASK 10.02	BUILD FORMS FOR CONCRETE FLAT WORK

RELATED TECHNICAL INFORMATION (Con't.):

- Identify and describe use of hand tools required for building forms.
- Identify or describe types of materials and equipment used for forming.
- Explain importance of tightness and strength in form construction.
- Define kerfing (cutting grooves [kerfs] across board to provide for bends, etc.).
- Explain how to construct curved forms.

UNIT 10.0 CONCRETE MASONRY

TASK 10.03 POUR AND FINISH A CONCRETE SIDEWALK

(NOTE: Concrete slab and walk may be combined as concrete flatwork.)

PERFORMANCE OBJECTIVE:

Given plans and specifications for concrete sidewalk, the necessary forms, premixed concrete, and the necessary tools, equipment, and materials; pour and finish a concrete sidewalk. The finished concrete must be level with the forms with the specified finish.

PERFORMANCE ACTIONS:

10.0301 (See actions for concrete slab [flatwork].)

PERFORMANCE STANDARDS:

- Pour and finish a concrete sidewalk to specifications and so the walk is level and with the required finish.

SUGGESTED INSTRUCTION TIME: *Integrated training task.

RELATED TECHNICAL INFORMATION:

- Given plans and specifications for a concrete sidewalk, prepared concrete, and the required tools, equipment, and materials; pour and finish a concrete sidewalk.
- Descibe strength of concrete needed for a walk.
- Describe/demonstrate how to get forms for a walkway.
- Explain/demonstrate how to screed off concrete.
- Determine type of finish of texture for concrete walk.
- Install expansion joints.
- Install grooves.

EXPANSION OF TASKS:

- Sidewalks.
- Driveways.
- Floors.

RATING SCALE: FINISHING CONCRETE

1.	Safety	10
2.	Workmanship	10
3.	Level	10
4.	Forming	10
5.	Grading out	10
6.	Grade pegs	10
7.	Straight	10
8.	Jitterbugging	10
9.	Pouring	10
10.	Finishing	10

TASK 10.04 POUR AND FINISH A CONCRETE SLAB

PERFORMANCE OBJECTIVE:

Given plans and specifications for a concrete slab, premixed concrete to specifications, and the necessary tools, equipment, and materials; pour and finish a concrete slab. The concrete must be to the proper level and finished with a slick finish.

PERFORMANCE ACTIONS:

10.0401 Pour premixed concrete in prepared forms.

10.0402 Finish concrete:

a. Screed concrete with wood or metal screed.
b. Darby or bull float concrete to level any ridges and fill voids and force aggregate below surface.

10.0403 Allow surface to begin to set; "bleed" to evaporate (about 5 hours).

10.0404 "Joint" and "edge" concrete.

10.0405 "Float" concrete for desired finish.

10.0406 "Travel" to desired degree of hardness, density, and smoothness.

10.0407 "Broom" surface, if required, to texture surface.

PERFORMANCE STANDARDS:

- Pour and finish premixed concrete in a prepared form for a slab.
- The finished concrete must be to the proper level and finished slick.

SUGGESTED INSTRUCTION TIME: *Integrated training task.

RELATED TECHNICAL INFORMATION:

- Define subgrade (as used in concrete slab work).
- Describe procedure for preparing subgrade before concrete is poured.
- Describe reinforcement techniques for concrete slabs.

RELATED TECHNICAL INFORMATION (Con't.):

- Define tensile strength as used in slab reinforcement.
- Identify basic joints in concrete and their purposes.
- Explain use of expansion joints and polyethlene.
- Describe procedure for pouring concrete.
- Identify/describe: stone pockets, puddling.
- Identify several finishes that may be given to concrete surfaces.
- Define screeding as used in finishing concrete surfaces.
- Define bleeding as used in placing concrete masonry slabs.
- Describe procedure for edging concrete slab.
- Explain reasons for jointing a concrete surface.
- Demonstrate use of jointing tool in jointing a concrete slab.
- Describe process of floating concrete surfaces.
- Explain use of or demonstrate: troweling machine, darby tool, bull float, screed board, hand trowel, and float.
- Demonstrate process of brooming a concrete slab.
- Describe procedure for concrete form removal.
- Define curing (as used in finishing concrete surfaces).

RATING SCALE: FINISHING CONCRETE

1.	Safety	10
2.	Workmanship	10
3.	Level	10
4.	Forming	10
5.	Grading out	10
6.	Grade pegs	10
7.	Straight	10
8.	Jitterbugging	10
9.	Pouring	10
10.	Finishing	10

Unit 10.0

STUDENT: ______________________________ DATE: __________

1. Calculate the amount of concrete required for a concrete slab 37' x 21' x 4" thick if one cubic yard of concrete will cover 81 square feet 4 inches thick.

calculations answer __________

2. Calculate the amount of concrete required for a slab that measures 12' x 12' x 4" if one cubic yard of concrete will cover 81 square feet 4 inches thick.

calculations answer __________

UNIT 11.0

COMMERCIAL AND DECORATIVE BRICKWORK

Every masonry graduate should be introduced to tasks in this commercial and decorative brickwork unit; however, these tasks basically represent advanced masonry skills which build upon basic skills which have been described previously and which should be mastered first.

MASONRY
COMMERCIAL AND DECORATIVE BRICKWORK
SUGGESTED INSTRUCTION TIMES

MASONRY UNIT/TASK		SUGGESTED HOURS
Unit 11.0	COMMERCIAL AND DECORATIVE BRICKWORK	
11.01	Lay Masonry Walks and Floors	*
11.02	Lay Herringbone Bond Pattern	*
11.03	Lay Basket Weave Pattern	*
11.04	Layout and Build a Garden Wall	*
11.05	Build a Barbecue Pit	*
11.06	Construct Planters	*
11.07	Lay Structural Clay (Glazed) Tile	*
11.08	Lay Ceramic Tile	*
11.09	Build a Segmental Arch	*
11.10	Construct a Common Jack Arch	*
	TOTAL HOURS	51

*Instructional planning time is summarized for the unit since tasks are learned as a continuous process rather than on a task by task basis.

Grand Total Second Year	540

TASK LISTINGS
MASONRY

UNIT/TASK	DESCRIPTION
Unit 11.0	COMMERCIAL AND DECORATIVE BRICKWORK
11.01	(Lay Masonry Walks and Floors) Given drawing or specifications, tools, equipment, mortar and paving brick, and other necessary supplies; lay paving brick to form walks and floors. The surface of the brick must be level with all of the holes and joints pointed and jointed to shed water. The bond pattern must be maintained.
11.02	(Lay Herringbone Bond Pattern) Provided with necessary tools, equipment, and supplies, brick and mortar, and building specifications; lay a herringbone bond pattern. All bricks must be laid at 45 degree angles with the appearance of a "W" or "M."
11.03	(Lay Basket Weave Pattern) Given an area to be paved in brick, brick and all necessary tools, equipment, and materials; lay a basket weave pattern over the area. All joints must be uniform and the finished paving must be flat and smooth.
11.04	(Layout and Build a Garden Wall) Given masonry tools, brick and mortar, and a plan for a garden wall; layout and build a garden wall with a brick cap laid with full joints and pointed up so as to shed water. Pattern of brick must meet plan specifications.
11.05	(Build a Barbecue Pit) Given specifications for an outdoor barbecue pit (outdoor fireplace), masonry units and mortar, and the necessary tools, equipment, and materials; build a barbecue pit. The outdoor fireplace must be within +/- 1/16 inch of specified overall dimensions, the walls must be level and plumb, and the joints must be uniform with specified tooled finish.
11.06	(Construct Planters) Given specifications or a drawing for a planter, bricks and mortar, and the necessary tools, equipment, and materials; build a brick planter. The finished planter must be straight, level, square and plumb, with equalized joints.
11.07	(Lay Structural Clay [Glazed] Tile) Given necessary tools, equipment, supplies, and building specifications; lay structural clay tile (running bond). Tile must be level, plumb, straightedged, ranged, and tooled to specifications.

11.08 (Lay Ceramic Tile) Given instruction, ceramic tile, and the required tools, equipment, and materials; lay ceramic tile to specifications so the tile is straight and level and represents the desired pattern.

11.09 (Build a Segmental Arch) Given tools, temporary center, materials, tools, and equipment; lay and build a specified (brick interlaced or 2 rowlock) segmental arch. The bricks in the arch must fit tightly against the temporary center and the work must be plumb.

11.10 (Construct a Common Jack Arch) Given instruction, masonry units, training mortar mix, mason's tools and equipment, necessary supplies, and plan to follow; construct a common jack arch to specifications and the instructor's standards.

UNIT 11.0 COMMERCIAL AND DECORATIVE BRICKWORK

TASK 11.01 LAY MASONRY WALKS AND FLOORS

PERFORMANCE OBJECTIVE:

Given drawing or specifications, tools, equipment, mortar and paving brick, and other necessary supplies; lay paving brick to form walks and floors. The surface of the brick must be level with all of the holes and joints pointed and jointed to shed water. The bond pattern must be maintained.

PERFORMANCE ACTIONS: (Paving in running bond.)

11.0101 Layout job.

11.0102 Construct frame to support sides of brickwork (establish points and elevation).

11.0103 Spread layer of sand to correct depth inside frame.

11.0104 Lay four bricks on each corner to required height, dry bonding to work full brick.

11.0105 Lay first course on highest end from edge to edge as tightly together as possible, tapping bricks together.

11.0106 Cut two halves (bats) for second course so brick pattern breaks half over previous course to form running bond.

11.0107 Continue laying each new course following established procedures.

11.0108 Level each course with opposite end of frame to ensure that paving is flush and has correct slope and to avoid low or high spots.

11.0109 Lay paving until job is complete.

11.0110 Check that paving is level.

11.0111 Finish joints to specifications.

PERFORMANCE STANDARDS:

- Lay masonry walks and floor (paving) to specifications.

PERFORMANCE STANDARDS (Con't.):

- Paving should be level with border bricks within +/- 1/16 inch with uniform joints tooled to desired finish and so they will shed water.
- The desired bond pattern must be maintained.

SUGGESTED INSTRUCTION TIME: *Integrated training task.

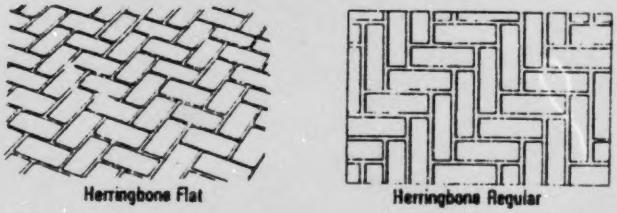
RELATED TECHNICAL INFORMATION:

- Masonry walk:
    - Type mortar.
    - Identify paving brick to meet specifications.
    - Identify pattern design.
    - Describe how to prevent absorption of mortar on face of brickwork.
- Masonry floor:
    - Identify proper type of brick to use.
    - Describe how to lay an unreinforced masonry floor.
    - Describe different techniques and materials used in constructing interior and exterior masonry floors.

EXPANSION OF TASK:

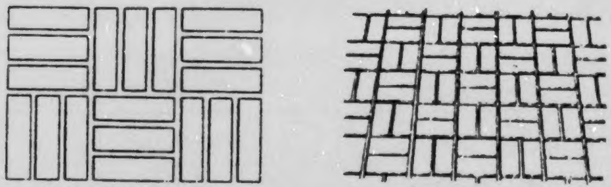
- Lay walks and floors in required patterns:
    a. Herringbone
    b. Basket weave

Types of Bonds



Herringbone Flat

Herringbone Regular



Basket Weave On Edge

Basket Weave Flat

UNIT 11.0 COMMERCIAL AND DECORATIVE BRICKWORK

TASK 11.02 LAY HERRINGBONE BOND PATTERN

PERFORMANCE OBJECTIVE:

Provided with necessary tools, equipment, and supplies, brick and mortar, and building specifications; lay a herringbone bond pattern. All bricks must be laid at 45 degree angles with the appearance of a "W" or "M."

PERFORMANCE ACTIONS:

11.0201	Cut two 2 3/4 inch and two 5 1/2 inch combination pieces.
11.0202	Bevel whole brick on corners.
11.0203	Determine center of pattern.
11.0204	Dry bond the pattern: Flat or regular as required.
11.0205	Bed up first section of pattern using 2 3/4 inch pieces as starter and 5 1/2 inch pieces as next unit.
11.0206	Bevel the end of whole brick to end at the top of 5 3/4 inch piece.
11.0207	Place whole brick across 5 3/4 inch piece and bevel brick.
11.0208	Repeat process (5-6-7) to end of herringbone pattern.
11.0209	Square dimensions of desired pattern area.

PERFORMANCE STANDARDS:

- Lay herringbone bond pattern paving so that all bricks are laid at 45 degree angles with the appearance of a "W" or "M."
- Process and product performance must meet instructor's standards.

SUGGESTED INSTRUCTION TIME: *Integrated training task.

RELATED TECHNICAL INFORMATION:

- Distinguish between flat and regular herringbone pattern.

UNIT 11.0 COMMERCIAL AND DECORATIVE BRICKWORK

TASK 11.03 LAY BASKET WEAVE PATTERN

PERFORMANCE OBJECTIVE:

Given an area to be paved in brick, brick and all necessary tools, equipment, and materials; lay a basket weave pattern over the area. All joints must be uniform and the finished paving must be flat and smooth.

PERFORMANCE ACTIONS:

11.0301 Determine type of brick.

11.0302 Prepare area to be laid in a bed of mortar or grout.

11.0303 Lay bricks according to basket weave pattern:

a. Layoff in 8 inch pattern.
b. Use a line to lay all brick over 48 inches.
c. Check pattern with level or straightedge to assure levelness.
d. Joint and point all brick.

PERFORMANCE STANDARDS:

- Lay basket weave pattern as required with all joints uniform and the finished paving flat and smooth.
- Performance process and product must meet instructor's standards.

SUGGESTED INSTRUCTION TIME: *Integrated training task.

RELATED TECHNICAL INFORMATION:

- Bonding a basket weave pattern garden wall.
- Safety.
- Mortarless paving.

UNIT 11.0 COMMERCIAL AND DECORATIVE BRICKWORK

TASK 11.04 LAYOUT AND BUILD A GARDEN WALL

PERFORMANCE OBJECTIVE:

Given masonry tools, brick and mortar, and a plan for a garden wall; layout and build a garden wall with a brick cap laid with full joints and pointed up so as to shed water. Pattern of brick must meet plan specifications.

PERFORMANCE ACTIONS:

11.0401 Layout and build specified design of a garden wall.

PERFORMANCE STANDARDS:

- Layout and build a specified garden wall to the instructor's standards.

SUGGESTED INSTRUCTION TIME: *Integrated training task.

RELATED TECHNICAL INFORMATION:

- Discuss design of wall.
- Identify type of brick to use.
- Describe the type of coping.
- Describe/demonstrate how to layout dry bond.
- Demonstrate building corner leads.
- Demonstrate attaching line.
- Demonstrate filling in courses.
- Demonstrate striking joints.

UNIT 11.0 COMMERCIAL AND DECORATIVE BRICKWORK

TASK 11.05 BUILD A BARBECUE PIT

PERFORMANCE OBJECTIVE:

Given specifications for an outdoor barbecue pit (outdoor fireplace), masonry units and mortar, and the necessary tools, equipment, and materials; build a barbecue pit. The outdoor fireplace must be within +/- 1/16 inch of specified overall dimensions, the walls must be level and plumb, and the joints must be uniform with specified tooled finish.

PERFORMANCE ACTIONS:

11.0501 Determine type of barbecue pit to be constructed including requirements for oven/fireplace and chimney.

11.0502 Prepare foundation excavation.

11.0503 Build foundation for fireplace to proper depth using appropriate reinforcement.

11.0504 Layout walls above grade dry to establish bond.

11.0505 Build walls.

11.0506 Tool mortar joints when they are thumbprint hard.

(NOTE: Task actions may vary in sequence.)

11.0507 Build firebox:

a. Determine height of grill.
b. Fit grill(s) into place.

11.0508 Build front of firebox, etc.

11.0509 Build chimney as required.

PERFORMANCE STANDARDS:

- Build an outdoor barbecue pit, fireplace or incinerator.
- The fireplace must meet specifications for type and size of brick and type of mortar.
- Overall dimensions must be within +/- 1/16 inch of specifications and the walls must be level and plumb, and the joints must be uniform with specified tooled finish.

SUGGESTED INSTRUCTION TIME: * Integrated training task.

RELATED TECHNICAL INFORMATION:

- Identify basic kinds and sizes of barbecue pits, outdoor fireplaces, or incinerators.
- Identify important materials and considerations in building a barbecue pit (foundation, walls above grade, etc.).
- Describe/demonstrate method of fitting grill into fireplace, (building firebox, determining height of grill, spacing grill).
- Explain how to bond steel bars in a barbecue grill structure.
- Describe considerations in building a barbecue pit chimney.

TASK 11.06 CONSTRUCT PLANTERS

PERFORMANCE OBJECTIVE:

Given specifications or a drawing for a planter, bricks and mortar, and the necessary tools, equipment, and materials; build a brick planter. The finished planter must be straight, level, square and plumb, with equalized joints.

PERFORMANCE ACTIONS:

11.0601	Determine how planter will be constructed.
11.0602	Dig and pour footing for planter.
11.0603	Dry bond bricks.
11.0604	Square and build to the height desired using a line for long walls and a level for walls less than 4 feet.
11.0605	Place weep holes at bottom of planter, about every 4 bricks, for water drainage.
11.0606	Finish face of planter wall to joint desired.

PERFORMANCE STANDARDS:

- Construct planters to specifications or according to drawing so that the finished product is straight, level, square, and plumb, with equalized joints.
- The finished planter should have properly placed weep holes for water drainage.

SUGGESTED INSTRUCTION TIME: *Integrated training task.

RELATED TECHNICAL INFORMATION:

- Kinds and shapes of typical planters.
- Layout of planters.
- Placing of weep holes.
- Use of weep holes.
- Keeping weep holes clear of mortar.
- Digging and pouring footings.
- Dry bonding.

UNIT 11.0 COMMERCIAL AND DECORATIVE BRICKWORK

TASK 11.07 LAY STRUCTURAL CLAY (GLAZED) TILE

PERFORMANCE OBJECTIVE:

Given necessary tools, equipment, supplies, and building specifications; lay structural clay tile (running bond). Tile must be level, plumb, straightedged, ranged, and tooled according to specifications.

PERFORMANCE ACTIONS:

11.0701 Take care in the unloading, stacking, and use of clay tile.

11.0702 Prepare mortar for glazed tile according to specifications.

11.0703 (For sanitary finish, use special epoxy mortar for pointing; not bedding.) Apply mortar with a joint width of about 1/4 inch, raking out mortar to depth of 1/4 inch as mortar can hold weight of tile and wiping mortar stains from face of tile with cloth, etc. Allow to cure about 24 hours.

(NOTE: Working life of epoxy mortar is about 45 minutes at 75 degrees.)

11.0704 Lay glazed tile in desired bond (e.g., running bond).

("See Advanced Masonry Skills by Kreh, Delmar Publishers, 1978, Unit 18, for recommended actions.")

11.0705 Clean structural clay tile of mortar.

11.0706 Tool joint and clean any remaining mortar.

PERFORMANCE STANDARDS:

- Lay structural clay (glazed) tile according to specifications so that the tile is level, plumb, straightedged, ranged, and tooled to specifications.

SUGGESTED INSTRUCTION TIME: *Integrated training task.

UNIT 11.0 COMMERCIAL AND DECORATIVE BRICKWORK

TASK 11.07 LAY STRUCTURAL CLAY (GLAZED) TILE (Con't.)

RELATED TECHNICAL INFORMATION:

- Recognize special kinds of tile.
- Identify, select, and use (as applicable) proper kind of mortar.
- Embed metal ties in wall as required by codes or specifications.
- Describe methods/techniques of laying structural clay tile.
- Identify: Cap, sill, stretcher, bullnose, cover corner, and cove base.
- Discuss how to mix mortar to produce a colored (white or off-white) mortar.
- Describe how to cut structural clay tile: With wet masonry saw equipped with a diamond blade.

UNIT 11.0 COMMERCIAL AND DECORATIVE BRICKWORK

TASK 11.08 LAY CERAMIC TILE

PERFORMANCE OBJECTIVE:

Given instruction, ceramic tiles, and the required tools, equipment, and materials; lay ceramic tile to specifications so the tile is straight and level and represents the desired pattern.

PERFORMANCE ACTIONS:

11.0801 Follow instructor's recommended techniques in laying ceramic tile to specifications.

PERFORMANCE STANDARDS:

- Lay ceramic tile to specifications and so tile is straight and level and represents desired pattern.

SUGGESTED INSTRUCTION TIME: *Integrated training task.

RELATED TECHNICAL INFORMATION:

- Describe/demonstrate procedure for establishing a starting point.
- Describe grouting.
- Describe how to select and use tile glue.

UNIT 11.0 COMMERCIAL AND DECORATIVE BRICKWORK

TASK 11.09 BUILD A SEGMENTAL ARCH

PERFORMANCE OBJECTIVE:

Given tools, temporary center, materials, tools, and equipment; lay and build a specified (brick interlaced or 2 rowlock) segmental arch. The bricks in the arch must fit tightly against the temporary center and the work must be plumb.

PERFORMANCE ACTIONS: (2 rowlock segmental arch, on 8 inch wall to 11 inch gauge.)

11.0901 Place temporary center on floor and layout trial course for bond.

11.0902 Build up 2 piers as abutments, 9 courses high. Straightedge front of piers level and plumb.

11.0903 Place 2 stays should be high enough so the springing point of the center will be about 1/2 inch below top of last course of brick.

11.0904 Place wood center level on top of stays and adjust with (4) wedged. Center must be level both ways on the bottom. The springing point of the center should meet top of last course of brick. Rise of center should be in course height, 2-3 courses.

11.0905 Build up leads for next 3 courses. Cut skewbacks by means of bevel square. Place bevel square on last course of level brick and a trial brick standing at right angles to center. The blade of the square should fit to the brick. Tighten up on square. The angle will be the proper one for the skewbacks of this particular arch as shown on the elevation.

11.0906 After the skewbacks are built, place a line on the 12th course. Space out bricks dry to determine number required and the thickness of the joints. Butter the brick with the face down. The brick must be tight for a strong arch.

11.0907 Increase leads and run out next rowlock which will have one more brick as the radius increases.

11.0908 Continue the leads and cut creepers to line.

PERFORMANCE ACTIONS (Con't.):

11.0909 When finished laying brick, release wedges and center will loosen so it can be removed.

11.0910 Finish joints on soffit.

PERFORMANCE STANDARDS:

- Build a segmental arch of the type specified to obtain the desired pattern and so the bricks in the arch fit tightly against the temporary center and so the work is plumb.

SUGGESTED INSTRUCTION TIME: *Integrated training task.

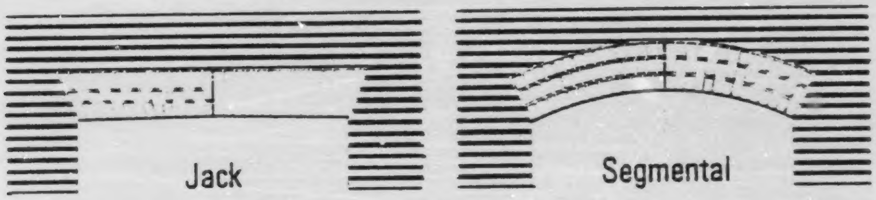
RELATED TECHNICAL INFORMATION:

- Types of arches.
- Classes of arches.
- Parts of an arch.
- Order an arch form from carpenter or build form as required.
- Lay segmental arch off.

EXPANSION OF TASK: (or alternate task/actions)

- "Layout and build an 8 inch interlaced segmental brick arch on a 12 inch wall."

Types of Arches



Jack

Segmental

UNIT 11.0 COMMERCIAL AND DECORATIVE BRICKWORK

TASK 11.10 CONSTRUCT A COMMON JACK ARCH[1]

PERFORMANCE OBJECTIVE:

Given instruction, masonry units, training mortar mix, mason's tools and equipment, necessary supplies, and plan to follow; construct a common jack arch to specifications and the instructor's standards.

PERFORMANCE ACTIONS:

11.1001 Assemble materials for project.

11.1002 Layout project with chalk line according to plan.

11.1003 Build piers on either side.

11.1004 Set lentil (angle iron) in place when height is reached so that both sides support equal loads.

11.1005 Rack up a lead on both sides of project 3 courses high, but not all the way out to the jam.

11.1006 Cut radius board to fit between piers at front bottom of opening.

11.1007 Locate center of radius board and attach nail, etc., at radial center point (bottom of board), attach cord to this.

11.1008 Draw line up to inside of piers to determine skewbacks.

11.1009 Cut skewbacks to line and lay in position.

11.1010 Move radius line across project to center and using spacing rule, mark off individual bricks, both on top and on bottom of angle iron using standard mortar joint.

11.1011 Lay keybrick to center of arch.

11.1012 Attach line at top and bottom of arch and proceed to lay jack arch from each end to center, cutting bricks so they lay level.

TASK 11.10 CONSTRUCT A COMMON JACK ARCH[1]

PERFORMANCE ACTIONS (Con't.):

11.1013 Check periodically to be sure arch is laid with radius line.

11.1014 Complete arch.

11.1015 If wall is thick, lay brick to back of arch according to specifications (e.g., stretchers).

11.1016 Strike joints and point up joints on bottom of arch.

PERFORMANCE STANDARDS:

- Construct a common jack arch to specifications and the instructor's standards.

SUGGESTED INSTRUCTION TIME: *Integrated training task.

RELATED TECHNICAL INFORMATION:

- Identify Jack Arch.
- Describe the jack arch.
- Describe where a common jack arch and a bonded jack arch might be used.
- Describe/demonstrate how to layout a jack arch from the radial center point.
- Define: Inclination, skewback radial center.
- Demonstrate how to mark off spacing of the arch bricks.
- Discuss type of mortar joint preferred (small) in arch.
- Describe how to butter masonry unit.

[1] Task adopted from Kreh, R. T., Sr., Advanced Masonry Skills, Albany, NY: Delmar Publishers Inc., 1978, Unit 22. (Recommended resource for student.)

EXPANSION OF TASK:

- Construct a bonded jack arch, typical of the kind used for decorative purposes on colonial architecture.

Unit 11.0

STUDENT: ________________________________ DATE: ______________

MULTIPLE CHOICE:

Select the best answer for each question or unfinished statement and indicate your answer in the space provided.

1. The most frequently used bond for building brick patio walls is ___.

   a. Flemish
   b. running
   c. stack
   d. common

2. The recommended mortar for exterior walls that come in contact with the earth is type ___.

   a. M
   b. S
   c. N
   d. O

3. A whitish stain that sometimes appears on the outside of planters or similar projects is due to the formation of ___.

   a. acid
   b. oxides
   c. salts
   d. lime

4. The first course in an 8 inch common bond wall is usually a ____ course.

   a. stretcher
   b. rowlock
   c. header
   d. soldier

5. Walls made of two tiers (wythes) of brick with an air space (usually about 2 inches) between them are called ___ walls.

   a. double
   b. cavity
   c. two-tier
   d. spaced

6. The correct drainage slope of an average patio floor is _____ inch.

   a. 1/8 - 1/4
   b. 1/4 - 3/8
   c. 3/8 - 1/3
   d. 1/2 - 5/8

7. The best tooled joint finish to use on brick paving or flooring is _____.

   a. grapevine
   b. concave
   c. convex
   d. flush

8. When installing the sand base for mortarless paving, the correct thickness to spread is _____ inch(es).

   a. 1/2 - 1
   b. 1 - 2
   c. 2 - 3
   d. 3 - 4

9. The best way to keep all bricks on a patio floor at a straight height is to use a _____.

   a. transit level
   b. line level
   c. wood straightedge
   d. plumb rule

10. To remove excess mortar from brick paving before it completely hardens, use _____.

   a. an acid wash
   b. a soft cloth
   c. a burlap bag
   d. water sprayed from a hose

STUDENT: ______________________________ DATE: _______________

PERFORMANCE TESTS:

1. Lay masonry walks and floors.

   Given specifications and drawing, tools, equipment, mortar and brick, and materials needed; lay paving brick to form walks, floors, etc., in the pattern specified. The surface of the brick must be level with all of the holes. Joints must be pointed and jointed to shed water. The bond pattern must be maintained. Paving should be level with border bricks within +/- 1/16 inch. The task must be accomplished in the time allocated.

CHECKLIST FOR EVALUATION

A	N	
☐	☐	1. Job properly planned.
☐	☐	2. Layout correctly done.
☐	☐	3. Dry bonding procedures correct.
☐	☐	4. Mortar spread properly, as applicable.
☐	☐	5. Bond pattern maintained.
☐	☐	6. Surface of brick level with no high or low spots.
☐	☐	7. Joints properly pointed and jointed to shed water.
☐	☐	8. Paving level with border bricks +/- 1/16 inch.
☐	☐	9. Workmanship.
☐	☐	10. Completeness.
☐	☐	11. Use of tools.
☐	☐	12. Clean and stored tools when finished.
☐	☐	13. Cleaned up working area.
☐	☐	14. Knowledge of assignment.
☐	☐	15. Attitude toward assignment.

A = Acceptable
N = Not acceptable

2. Lay a herringbone bond pattern (paving) so that all bricks are laid at 45 degrees with the appearance of a "W" or "M." Performance process and product must be to the instructor's standards in the time allocated.

   COMPETENCY LEVEL: 0 ☐
   COMPETENCY LEVEL: 1 ☐
   COMPETENCY LEVEL: 2 ☐
   COMPETENCY LEVEL: 3 ☐
   COMPETENCY LEVEL: 4 ☐

3. Lay a basket weave pattern as required with all joints uniform and the finished paving flat and smooth. Performance process and product must meet instructor's standards. The task must be completed in the time allocated.

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

4. Layout and build a garden wall to specifications or plans, with a brick cap laid with full joints and pointed up so as to shed water. The pattern must be uniform and meet specifications. The job must be accomplished in the given time and meet the instructor's standards for performance process and product.

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

5. Build a barbecue pit (outdoor fireplace) to specifications and plans for type and size of brick and type of mortar. Overall dimensions must be within +/- 1/16 inch of specifications and the walls must be level and plumb, and the joints must be uniform with specified tooled finish. The task must be completed in the time allocated and must meet the instructor's standards for performance process and product.

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

6. Construct planters to specifications or according to drawing so that the finished product is straight, level, square, and plumb, with equalized joints. The finished planter should have properly placed weep holes for water drainage. The task must be completed in the time provided. Performance process and product must be to the instructor's standards.

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

7. Lay structural clay tile according to specifications so that the tile is level, plumb, straightedged, ranged and tooled to specifications. Demonstrate proper procedures for a sanitary finish. Performance process and product must be to the standards of the instructor.

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

8. Lay ceramic tile to specifications so tile is straight and level and represents desired pattern. The task must be completed in the time allocated by the instructor. Performance process and product must meet instructor's standards.

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

9. Build a segmental arch of the type specified to obtain the desired pattern and so the bricks in the arch fit tightly against the temporary center and so the work is plumb. Joints will be finished properly. The task must be accomplished in the time allocated by the instructor. Performance process and product must meet the instructor's standards.

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

10. Build a common jack arch of the type specified to obtain the desired pattern and so the bricks in the arch fit tightly against the temporary center and so the work is plumb. The task must be completed in the time allocated. Performance process and product must be to the instructor's standards.

COMPETENCY LEVEL: 0 ( )
COMPETENCY LEVEL: 1 ( )
COMPETENCY LEVEL: 2 ( )
COMPETENCY LEVEL: 3 ( )
COMPETENCY LEVEL: 4 ( )

UNIT 12.0

MASONRY SHOP PROJECTS

Secondary Masonry Task Force Committee instructors agree that they utilize shop projects such as constructing fireplaces and decorative walls during the first and second years of the training program to promote skill development. Typically, more practical work is employed during the second year of training since much of the theory of brickmasonry is learned during the initial year.

While many of the shop projects are for skill development and use training mortar so the masonry units may be reused for other projects, some shop projects such as decorative entrances for driveways/yards, yard lamp post columns, and steps may be built in the shop for transport and use in the field. Live field projects are used for training also.

Essentially, the purposes of the shop construction projects include:

a. Providing individualized training in basic and advance masonry practices.

b. Providing learning opportunities for the student according to the student's special abilities, career interests, or to meet potential needs of employers at a particular time.

c. Providing opportunities for the instructor to test the student's knowledge and skill development in simulated or realistic situations (hands-on examination).

d. Providing an opportunity where the instructor may conduct a "final examination" of basic masonry skills demonstrated in simulated or applied situation.

e. Providing opportunities for each student to develop general competencies or special masonry or masonry related skills and knowledges. Shop projects may be designed to help students gain advanced skills in masonry or expand their skill development beyond the typical masonry program.

If individualized learning situations are offered, the following is RECOMMENDED:

"Individual learning situations should be accompanied by a written plan indicating the objective, major steps or student actions necessary to reach the objective, minimum standards expected of the student, and how the student will be evaluated. This individualized learning plan should be developed mutually by the instructor, other participating instructors as applicable, the student, and others directly involved."

Today, secondary level vocational programs such as Masonry are being taught in a more realistic manner and setting. Where student interest is high, basic masonry skill training may be followed up by applied live projects in the field, if it is feasible.

A live field project may involve only masonry students or may involve other building construction students such as carpentry, electricity, tile setting, air conditioning-refrigeration-heating, plumbing, and sheet metal students or even accounting and recordkeeping students in office education programs.

Live masonry field projects should always be chosen so that there will be no direct competition with local businesses. The improvement of low-income family dwellings and the improvement of the community probably should be given high priority in the selection of masonry field projects.

Typically, the production of the masonry student in a live field project will be low and slow because the primary aim is teaching. Emphasis in field jobs is placed on developing skills for the masonry trade. A job not done right may have to be done over by the student. Live masonry field projects, however, provide a unique opportunity for students to encounter, in a controlled setting, day-to-day construction problems that never would occur in the classroom.

Well planned, field masonry projects may provide exceptional instructional opportunities. Masonry instructors from two career centers might combine their students at one construction site. In addition to increasing student manpower, joint training would provide students with a situation where they should benefit from the diversified trade experience of two instructors instead of one.

Live masonry field projects, however, require more instructor planning. Careful scheduling is necessary to ensure that students can reach the job site, learn, practice skills, and return to their home schools within given times. In addition, activities must be arranged in the proper sequence so that students do not become 'bunched-up' on the job and so that the masonry project develops properly.

A side benefit that can result from live masonry projects is that the students may develop good work habits and attitudes in addition to increasing their knowledges and skills in masonry.

Some examples of masonry field projects include building ornamental driveway gates for school, repairing or constructing ornamental garden walls, walks, outdoor (barbecue) fireplaces, steps and porches, and even small structures. These or other projects provide realistic training for students and, at the same time, may result in a saving to taxpayers when done for nearby public schools. Typically, field jobs for private individuals should involve a small fee to cover the cost of materials and expendibles and to provide the masonry program a small fund to help support optimum training.

When undertaking field masonry projects, a detailed plan outlining objectives, actions necessary to obtain objectives, standards of performance and production, and the criteria for evaluation should be developed and followed daily.

PERFORMANCE STANDARDS:

1. PLAN PRACTICAL MASONRY FIELD PROJECT WITH INSTRUCTOR OR OTHERS

   Given identified student or program (potential employer needs) and a practical field masonry job that is related to training objectives, the student should participate in planning the field training project so that the student can explain the purpose, the student's role, and the potential benefits from the field training with 100 percent accuracy.

   NOTE: It is recommended that a written plan clarify the; (a) objective of the training project, (b) major student actions (steps) to obtain the objective, (c) minimum acceptable standards of performance for competency, and (d) how the student's competency will be measured. The student should agree to the plan of training.

2. PARTICIPATE IN FIELD MASONRY PROJECT (TRAINING)

   Given a written plan for a field masonry project, the student should participate in the training program in an agreed upon manner, meeting minimum standards of performance as outlined.

   The student should perform the required masonry or masonry related duties specified by the instructor to the instructor's standards.

3. SUCCESSFULLY PASS KNOWLEDGE OR WRITTEN TESTS ON PROJECT

Given a written plan for a special masonry field project, mutually agreed upon minimum standards, and a process for testing knowledge or performance skills in the training program; the student should meet the necessary minimum standards to indicate competency in the desired masonry skills and knowledges required by the practical application project.

FIELD PROJECT: ______________________________

RELATED CURRICULUM TOPIC: ______________________________

TASK NOS: ________, ________, ________, ________, ________

PERFORMANCE OBJECTIVE:

(What is student given? What behavior is expected of student? What standard of performance is expected?)

DESCRIBE **MAJOR** STEPS OF TASK (JOB):	THIS STEP COMPLETE WHEN BELOW STANDARDS DEMONSTRATED
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

STANDARDS (CRITERIA) OF PERFORMANCE THAT INDICATES THAT STUDENTS HAS COMPLETED TASK:

PLANNED INSTRUCTIONAL TIME: ________ Hours

(Estimated travel to/from: ________ Hours On Job: ________ Hours)

DATE TASK STARTED: ______________ DATE TASK FINISHED: ______________

RELATED KNOWLEDGE TRAINING	RELATED SKILL TRAINING

NOTES COMMENTS:

INSTRUCTOR: ATTACH PLANS, INSTRUCTIONS, TESTS, ETC.

Unit 12.0

STUDENT: ________________________________ DATE: __________

For each masonry shop or field project, it is recommended that a checklist be used by the instructor to help evaluate the student's competency.

The following checklists may be used if the instructor does not wish to develop or use his own checklist.

GENERAL PERFORMANCE EVALUATION CHECKLIST

A	N	
( )	( )	1. Safety.
( )	( )	2. Planning.
( )	( )	3. Layout.
( )	( )	4. Spreading mortar.
( )	( )	5. Level.
( )	( )	6. Plumb.
( )	( )	7. Straight.
( )	( )	8. To line.
( )	( )	9. Use of tools.
( )	( )	10. Cleaned and replaced tools.
( )	( )	11. Workmanship.
( )	( )	12. Completeness of job.
( )	( )	13. Cleaned up work area.
( )	( )	14. Knowledge of job.
( )	( )	15. Attitude toward assignment.
( )	( )	16. Process to instructor's standards.
( )	( )	17. Product to instructor's standards.
( )	( )	18. Completed project in time allocated.
( )	( )	19. To all specifications.

A = Acceptable
N = Not acceptable

OVERALL COMPETENCY LEVEL: 0 ( )
OVERALL COMPETENCY LEVEL: 1 ( )
OVERALL COMPETENCY LEVEL: 2 ( )
OVERALL COMPETENCY LEVEL: 3 ( )
OVERALL COMPETENCY LEVEL: 4 ( )

RATING SCALE

FINISHING CONCRETE

1.	Safety	10
2.	Workmanship	10
3.	Level	10
4.	Forming	10
5.	Grading out	10
6.	Grade pegs	10
7.	Straight	10
8.	Jitterbugging	10
9.	Pouring	10
10.	Finishing	10
	TOTAL	100

ANSWER SHEET

Unit 1.0 F

1. 1/2-1-6
2. 3-3-9
3. 6-6-36
4. 5-5-15
5. 3
6. c
7. a
8. c
9. b
10. c
11. a

Unit 2.0

1. b
2. b
3. a
4. a, b, c
5. a, b
6. b
7. c
8. b
9. b
   a
   e
   c
   d
10. blade
    heel
    handle
    frog
    shank
    ferrule
11. brick spacing rule
    modular spacing rule
12. flat
    round
    beaded
    tuck pointer
    grapevine
    sled runner
13. masonry line
    line blocks
    chalk box
    trig
    line pin
14. b
    a

ANSWER SHEET

Unit 4.0

1. b
2. d
3.
4. b
5. a
6. d
7. c
8. d
9. c
10. c
11. b
12. a
13.

ANSWER SHEET

Unit 4.0

1. b
2. d
3.
4. b
5. a
6. d
7. c
8. d
9. c
10. c
11. b
12. a
13. yes
    yes
    yes
14. yes
    no
    yes
    no
15. c
    a
    e
    h
    b
    d
    g
    f
16. b
    a
    d
    g
    c
    e
    f

Unit 5.0

1. core hole
   bottom
   end
   face
   top
2. 288
   216
   144
   126
3. 1512
   1512
4. b
5. 2050
   16 bags
   2 1/2 tons
6. stretcher
   header
   soldier
   rowlock header
   rowlock
   sailor
7. e
   a
   b
   h
   f
   g
   d
   c

ANSWER SHEET

Unit 6.0

1. 220
   165
   4
   622
   38
   21
   3
   105

Block = $466.50
Sand = $45.00
Cement = $73.50
TOTAL = $1,632.75

MULTIPLE CHOICE:

1. b
2. c
3. c
4. c
5. c, a

Unit 7.0

1. i
   d
   a
   e
   f
   h
   k
   g
   j
   l

2. eyepiece
   telescope barrel
   focusing screw
   sun shade
   bubble tube
   leveling head
   leveling screw
   head plate
   tripode
   leg thumb
   slow motion screw
   clamp

Unit 8.0

1. concrete cap
   flashing
   fire stop
   flue lining
   smoke chamber
   mantle
   smoke shelf
   throat
   profile
   damper
   fire brick
   ash dump
   hearth
   reinforced slab
   ash pit
   clean out door

ANSWER SHEET

Unit 9.0

MULTIPLE CHOICE:

1. c
2. a
3. a
4. b
5. d
6. c
7. vertical
8. water
9. grade
10. strenghten

MULTIPLE CHOICE:

1. c
2. a
3. b
4. c
5. c
6. c
7. a
8. c
9. d
10. c

Unit 10.0

1. 9.6 cubic yard
2. 1.77 cubic yard

Unit 11.0

1. c
2. a
3. c
4. c
5. b
6. a
7. b
8. a
9. c
10. c

TASKS OMITTED FROM THIS GUIDE

Because of training time limitations, some job tasks have been omitted from this guide. Secondary instructor participants of the Masonry Task Force Committee recommended that the articulated guide (secondary curriculum guide) should; (a) encompass the existing S.C. State curriculum guide which it does, (b) should represent realistically the local secondary masonry program underway which it does, (c) and should provide a basis for articulation between the secondary and post-secondary masonry programs which it does. In addition, the guide encompasses the brickmasonry skills outlined in the V-TECS Catalog for Masonry and basically meets the training program suggested by the Associated General Contractors of America.

Job areas which have not been included in this guide are block construction (provisions are in guide if block construction is needed) and stone masonry.

The Task Force Committee preferred to describe a sound program of brick masonry with an appropriate coverage of block and concrete work to prepare the graduate for successful entry in the local brick masonry construction trade.

While some task descriptions may have been omitted from this articulated guide, individual instructors may include those or other task in their instruction and will be encouraged to exceed the minimum standards described in this guide.

PROFICIENCY REPORT

PROFICIENCY REPORT
for

____
Vocational Course

Student: ______________________________

High School: ______________________________

Career Center: ______________________________

Date Training Initiated: __________
First Year Completed: __________
Second Year Initiated: __________
Second Year Completed: __________

Instructor: ______________________________

DIRECTIONS: The purpose of the proficiency report is to communicate to the student, other instructors, or potential employers the abilities that a student has demonstrated to the instructor in vocational training. Mark each task as soon as possible after instruction or skills demonstrated. If instruction is not aimed as task proficiency, or if only an orientation or introduction to the task was provided, DO NOT mark a proficiency level or mark Level 0. Levels 1-4 indicate that instruction was given and the proficiency may be interpreted as follows:

Level 0	No skill level demonstrated or proficiency training not given in the skill.
Level 1	Individual's skill level is not that generally expected for entry level employment.
Level 2	Individual's skill level probably is that generally expected for entry level employment, but the individual probably will need close on-the-job supervision for a while longer.
Level 3	Individual's skill level is that generally expected for entry level employment.
Level 4	Individual's skill level is equal to that of a worker with some on-the-job experience.

For further description of the levels of proficiency, see the "Credentialing Process and Proficiency Report" section of the Policies and Procedures Guide for Articulation Between The School District of Greenville County and Greenville Technical College.

Student: ______________________________

PROFICIENCY REPORT

MASONRY

See "cover sheet" for explanation of proficiency rating scale.

			Proficiency Level 0	Level 1	Level 2	Level 3	Level 4	Date Completed
UNIT	1.0	GENERAL						
	1.01 A	Followed Career Center Policies and Procedures						
	1.03 A	Reviewed Course Objectives and Standards						
	1.02 B	Exhibited Desirable Vocational Training Safety Habits						
	1.03 B	Observed Classroom Safety Practices						
	1.05 B	Applied Electrical Safety Rules and Procedures						
	1.01 C	Worked Cooperatively with Fellow Students						
	1.02 C	Demonstrated Desirable Characteristics of Leadership						
	1.01 E	Exhibited Work Habits Important to Job Success						
	1.02 E	Exhibited Successful Job Performance Characteristics						
	1.03 E	Exhibited Desirable Work Attitudes						
	1.04 E	Demonstrated Respect for and Care of Property						
	1.0 F	Basic Math Skills Acceptable for Masonry Work						
	1.01 G	Made Measurements Necessary in Masonry Work						
UNIT	2.0	TOOLS AND EQUIPMENT						
	2.01	Demonstrated Use of Masonry Hand Tools						
	2.02	Identified and Correctly Used Related Equipment in Masonry						
	2.03	Read Modular and Spacing Rules						
	2.04	Set Up Scaffolding						
	2.05	Used Story Pole						
UNIT	3.0	INTRODUCTION TO BLUEPRINT READING						
	3.01	Identified Working Drawings and Blueprint and Read Specifications						
	3.02	Interpreted Common Blueprint Symbols						
	3.03	Interpreted Dimensions from Blueprints						
	3.04	Read Blueprint and Specifications and Estimated Materials for Job						

			Proficiency Level 0	Level 1	Level 2	Level 3	Level 4	Date Completed
UNIT	4.0	MIXING MORTAR						
	4.01	Mixed Mortar by Hand						
	4.02	Mixed Mortar with Mechanically-Powered Mixer						
	4.03	Select Basic Materials						
	4.04	Set Up Mortar Boards and Placed Mortar						
	4.05	Spread Mortar to Entry Level Standards						
UNIT	5.0	BASIC BRICKLAYING, JOINTING, AND POINTING						
	5.01	Estimated Brick Masonry Units						
	5.02	Laid a Rowlock Course						
	5.04	Dry Bond a Wall						
	5.05	Hand Cut and Power Sawed Brick						
	5.06	Cut a Bat Closure						
	5.07	Laid a Stretcher Course to Line (Running Bond)						
	5.08	Laid a Full Header Course to Line (Common, American)						
	5.09	Laid out a Stack Bond Wall						
	5.12	Laid a Diamond Bond Wall						
	5.13	Laid a Brick Corner						
	5.15 - 5.19	Tooled Concave, Rake, V-Joints, Convex, and Flush Finish Joints						
	5.20	Constructed a 4 Inch Rack-Back Lead in Running Bond						
	5.21	Constructed an Outside and Inside Brick Corner for a 4 Inch Wall in Running Bond						
	5.22	Laid Brick Corner and Build a Wall in Running Bond with Line						
UNIT	6.0	BASIC BLOCKLAYING, JOINTING, AND POINTING						
	6.01	Estimated Concrete Masonry Units						
	6.02	Spread Mortar to Entry Level Standards						
	6.03	Bonded a Block Wall						
	6.04	Laid a Stretcher Course to Line in Concrete Block						
	6.05	Tooled Block Joints						
	6.06	Built Concrete Block Corner						
	6.07	Raised a Concrete Block Foundation Wall						
	6.10	Laid Vertical Bond Pattern (Stack Bond) Concrete Block Wall						

			Proficiency Level 0	Level 1	Level 2	Level 3	Level 4	Date Completed
UNIT	7.0	SITE PREPARATION, FOUNDATION, AND FOOTINGS						
	7.01	Set Up and Used the Builder's Level						
	7.02	Identified Property Lines, Reference Points, and Setback						
	7.03	Laid out Simple Building Site						
	7.04	Set Up Batter Boards and Attached a Building Line						
	7.05	Located and Squared Corners						
	7.06	Located and Marked Excavation Lines						
	7.08	Constructed Stepped Footings						
	7.10	Calculated Concrete for Footings and Foundation Walls						
UNIT	8.0	CHIMNEYS AND FIREPLACES						
	8.01	Laid out a Chimney (Foundation)						
	8.02	Built an Ash Pit						
	8.03	Installed a Clean-out Door						
	8.04	Laid Fireplace Floor (Rough Hearth) and Roughed in an Ash Dump						
	8.05	Laid Throat, Installed Damper, and Formed a Smoke Shelf						
	8.06	Built a Chimney (Smoke Chamber)						
	8.07	Cut Flue Liner						
	8.08	Set Flue						
	8.09	Topped and Capped Chimney						
	8.10	Prepared Chimney for Flashing						
	8.11	Laid and Outer Hearth						
	8.12	Finished Back, Bottom, and Sides of Fireplace						
	8.13	Laid a Mantel						
UNIT	9.0	BRICK CONSTRUCTION TECHNIQUES						
	9.01	Marked Window Sill, Window, and Door Heights						
	9.02	Marked Courses to Height						
	9.03	Used Corner Pole (Used Story Pole)						
	9.04	Constructed a Brick Veneer Wall						
	9.05	Laid Bricks Under Freize Board						
	9.06	Laid Rowlock Window Sill						
	9.07	Installed Wall Anchors and Ties						
	9.08	Set Lintels						
	9.09	Set Window Frames						
	9.10	Set Door Frame and Anchored Door to Wall						
	9.11	Constructed a Cavity Wall						
	9.12	Formed a Corbel						
	9.13	Constructed a Column and Pier						
	9.14	Constructed Walls Containing Pilasters						

		Proficiency Level 0	Level 1	Level 2	Level 3	Level 4	Date Completed
UNIT 10.0	CONCRETE MASONRY						
10.01	Estimated Concrete for Slab (Flat Work)						
UNIT 11.0	COMMERCIAL AND DECORATIVE BRICKWORK						
11.01	Laid Masonry Walks and Floors						
11.02	Laid Herringbone Bond Pattern						
11.03	Laid Basket Weave Pattern						
11.04	Laid out and Built a Garden Wall						
11.05	Built a Barbecue Pit						
11.06	Constructed Planters						
11.07	Laid Structural Clay (Glazed) Tile						
11.08	Laid Ceramic Tile						
11.09	Built a Segmental Arch						
11.10	Constructed a Common Jack Arch						
UNIT 12.0	MASONRY SHOP PROJECTS: General Summary						

COMMENTS: ____

Instructor: ______________________________ Date: __________

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APPENDIXES

APPENDIX A	JOINT ARTICULATION AGREEMENT
APPENDIX B	INSTRUCTOR'S SIGNED AGREEMENT TO ARTICULATE
APPENDIX C	PHILOSOPHY OF ARTICULATION GUIDE DESIGN
APPENDIX D	PURPOSES OF ARTICULATION GUIDE
APPENDIX E	DEFINITION OF TERMS
APPENDIX F	CRITERIA FOR SCHOLARSHIP STUDENT
APPENDIX G	DIRECTIONS FOR TESTS
APPENDIX H	ANALYSIS OF SECONDARY INSTRUCTION TIMES
APPENDIX I	RESPONSIBILITY SHEET
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APPENDIX A

THE SCHOOL DISTRICT
OF GREENVILLE COUNTY

GREENVILLE TECHNICAL COLLEGE

TO: All Administrators, Staffs and Faculties, The School District of Greenville County and Greenville Technical College

SUBJECT: Application and Implementation of the Policies and Procedures for the Articulation of Similar Vocational Training Programs of Instruction

Since 1976, The School District of Greenville County and Greenville Technical College have been working toward making the articulation of vocational education programs a viable and valid reality. Through joint efforts in the Occupational Education Articulation Program, The School District of Greenville County and Greenville Technical College fully support the concept of articulation and agree upon the purposes of the articulation program.

This Policies and Procedures Guide has been developed as a joint effort of The School District of Greenville County and Greenville Technical College with the assistance of individuals representing the institutional administrative units, involved faculty, and the local business and industrial community. The Policies and Procedures Guide is designed to assist the articulation of very similar programs of vocational training between the secondary and post-secondary, public, vocational training institutions in Greenville County.

Appreciation is expressed to participants at both institutions for the joint effort of this endeavor.

J. F. Hall

J. F. Hall
Superintendent
The School District of
Greenville County

Thomas E. Barton

Thomas E. Barton
President
Greenville Technical College

TASK FORCE COMMITTEE
AGREEMENT TO ARTICULATE
VOCATIONAL EDUCATION

Articulation provides a system whereby secondary and post-secondary instructors can cooperate effectively in providing a continuous occupational development program where the level and type of vocational training that leads to entry-level employment skills will be clear to instructors, other educators, students, and potential employers.

The concept of articulation and the articulation program are supported fully be The School District of Greenville County and Greenville Technical College which have agreed upon a statement of purpose for the articulation of similar vocational education programs in Greenville County.

The articulation program in Greenville County is a joint effort of The School District of Greenville County and Greenville Technical College to develop a continuous program of vocational training so that students may continue their career preparation without loss of time or waste of effort in repeating tasks which have been learned previously and demonstrated. Articulation program activities are designed to help remove unnecessary gaps or overlap in student learning which may occur when a student completes a secondary vocational program and continues career development at the post-secondary level in a similar occupational field.

To implement articulation, instructor representatives from the participating institutions have met as a task force committee to develop this articulated, performance-based instruction guide which describes the secondary vocational program and which provides the parameters for vertical articulation.

Vertical articulation shall include recognition of the occupational competencies demonstrated by secondary graduates of articulated vocational programs.

It is agreed that...

The task force committee instructor representatives from The School District of Greenville County and Greenville Technical College mutually recognize the value of occupational education provided by each institution.

The task force committee instructor representatives will take the necessary actions, approved by their administrations, to ensure that this agreement to articulate is fulfilled including interpreting the program to students.

It is understood that periodic review of the articulated task objectives, performance actions, minimum standards, and outcome-referenced measures will be necessary to ensure that a valid training program is serving the needs of the community and the students.

Each task force committee participant hereby agrees to notify the others of any changes which modify the articulated, performance-based vocational program described in this guide so that each articulation guide, and where appropriate the articulation program, may be revised mutually so that articulated occupational training in Greenville County will conform to the minimum standards outlined in this guide.

This agreement to articulate establishes the necessary framework for lateral as well as vertical articulation.

AGREED UPON BY THE TASK FORCE COMMITTEE PARTICIPANTS ON THIS DAY,
March 29 1984
date

Name	Institution/School
[illegible]	Enoree Career Center
[illegible]	Golden Strip Career Center
William [illegible] Jr	Donaldson Career Center
Edgar Cannon	Foothills Career Center
Ralph [illegible]	Greenville Tec

PHILOSOPHY OF ARTICULATED, PERFORMANCE-BASED INSTRUCTION GUIDE DESIGN

The design of the articulated, performance-based instruction guides and the articulation program is based on a philosophy that the vocational education curriculum should be for career training with few fringe or non-related subjects. The student should be given the basis to do useful skilled work upon graduation and employment. The vocational program graduate should have a background which will allow him/her to learn and advance as rapidly as possible on the job, but it should not include subject matter which will not be applicable to his/her work for years. When subject matter is introduced that will not be applicable to the graduate's work for years, it may put the graduate out of perspective. The result might be that the graduate may try to force applications which do not exist, simply because the information is in his/her repertoire. Thus, the purpose of vocational training by the articulated, performance-based instruction guides is to prepare graduates for successful entry into a skilled trade.

To ensure that the design of the articulated, performance-based instruction guides is conforming to the philosophies of both the secondary and post-secondary institutional participants, a periodic review of the guide design and philosophy is recommended.

APPENDIX D

PURPOSES OF THE ARTICULATED INSTRUCTION GUIDE

The articulated instruction objectives guide are is expected to serve the following purposes:

1. The guide serves as the primary vehicle for the articulation of subject matter in similar vocational training programs between the vocational education centers, high schools, and Greenville Technical College through use by instructors at both levels as a reference in preparing instruction.

2. The guide provides a listing of the minimum tasks that a student or worker is expected to perform in the conduct of a specific level job in the area of vocational training or work of concern.

3. The guides identify the primary detailed instruction objectives, performance objectives which are based upon the task listings. The tasks are listed in the sequence of complexity, with the least complex task being listed first, except where a task must be performed as a prerequisite to performance of another task.

4. The guides identify the tasks performed (actions, steps, sets of skills) and related technical information which must be taught and learned to accomplish each major instruction objective. The tasks performed represent the minimum skills and related information required for adequate occupational proficiency in the performance objectives.

5. The guides designate the instructional contact hours necessary to provide the required instruction, as required by appropriate educational agencies or offices and as estimated by the instructor-participants on the Vocational Articulation Project Task Forces, and based on the time required to teach the average learner to perform the task. The time estimated is based on having the essential equipment, facilities and instructional aids required to provide the instruction, whenever the class size is limited to an acceptable number.

6. The guides identify the performance standards to be met for occupational proficiency in the task. Performance standards used are those considered to be minimum business or industry standards. The ability to meet the listed standards of performance will be considered as qualification for advanced instruction in the vocational program.

7. The guides provide direction in the conduct of sequential vocational competency instruction by modules or job tasks, resulting in qualification by the learner to perform limited skill specialist jobs of

progressively higher skills until the program objective is reached (i.e., file clerk to executive secretary, etc.). As the student becomes proficient in the performance of tasks in successively more complex modules, more marketable competencies are gained and may be identified as the lower job qualifications of a specialist.

Through this procedure, even the slower student is provided an opportunity to eventually gain sufficient skills to perform adequately as a specialist at some level in the vocational field, even if the student is unable to complete the total program of training.

The standardized sequence of activities of the vocational instruction modules will facilitate lateral articulation between vocational education centers in the School District and will simplify vertical articulation when training is continued at Greenville Technical College articulating to employers.

8. The guides provide a descriptive listing of equipment required to conduct the program of vocational training. The equipment listed is considered to be the type and quantity essential for the conduct of instruction to prepare students for entry-level employment in the vocational field. It may be necessary to delay teaching some tasks involving special equipment, if that equipment is not available at all instructional sites, or to move students and equipment together as necessary to teach skills.

9. The guide provides information about requirements or limitations that typically are involved in the performance of the task, environmental conditions and physical demands, and able to perform the task.

10. The guides provide a list of standardized performance test items/ and outcome-referenced measures to be used in the determination of vocational proficiency. As long as the specifics are not provided, the test items listed cannot be compromised easily and could serve as study guides.

11. The tasks listed in the guide are the minimum requirements for job qualification under average circumstances in a regional market. It is understood that there may be unlisted tasks that some employers may require the worker to do in the occupation, when in their employment. In addition, there may be unlisted tasks, such as mental process tasks, that are not stated but that may occur and that should be considered in instructional planning or testing.

    Instructors may teach skills and related technical information other than what is shown in the guides. Provision of additional information should be limited to the students who have completed the requirements for the tasks emphasized in the instructional guides. The change of tasks in the guides should be based on task force committee agreement to ensure lateral and vertical articulation.

12. It is expected that there will be updating and correction of items in the articulated instruction guide. Participants are to be sure that the contents are valid and consistent with business and industry requirements. Recommendations should be submitted to the Vocational Articulation Program office which will assemble and present them to the appropriate committee for review and possible adoption.

13. Typically, the teacher/instructor should not plan to conduct instruction in a given articulated module unless the capability exists to conduct all of the instruction to meet the instructional objectives, with the result that the successful student is qualified to perform the tasks identified within the module.

14. An underlying philosophy in vocational training is that it is better to prepare the student to be fully qualified to perform all of the tasks in a limited group of modules in a vocational field and be qualified at a lower job level rather than to be only familiar with a large number of task descriptions or duties and qualified to perform none of them fully. For higher levels of job qualification beyond the secondary level, the student or worker is encouraged to enroll at Greenville Technical College.

15. Generally, vocational programs will include certain basic modules or courses of instruction without which the student would not be considered vocationally qualified at any level. Basic modules typically will be identified and taught early in the program sequence.

16. The instruction guides provides information essential to help the vocational student who completes training at the secondary level and continues career development training at the post-secondary level in a similar program receive appropriate credit for the articulated vocational training that has been mastered at the secondary level.

DEFINITIONS OF TERMS

The following definitions of terms are applicable to the articulated, performance-based instruction guides developed as products of the Occupational Education Articulation Program.

Behavior: The actions of a person (specifically, job or job training actions). Behavioral actions include both overt, those that can be observed, and covert, those not observable outwardly. Performance may be interchanged with behavior in the project. (See also Performance Actions).

Concept: A group of ideas that may be classed together or that are similar.

Criteria: A standard by which performance may be measured, usually considered the minimum standard.

Domain: A cluster of related jobs.

Duty: One of the distinct major activities involved in the work performed and comprising related tasks.

Evaluation: When comparison is made between a measurement and a standard and judgment is passed on the comparison.

Item: A single stimulus or stimulus pattern that calls for a single response or set of responses. It is one sample of behavior or performance. The response may be simple or complex.

Job: The duties or tasks actually performed by a specified individual.

Knowledge: In this project, knowledge refers to acquired covert behavior which facilitates skills and performance, such as the theoretical information of what should be done under given circumstances, and in what order of sequence performance should occur to accomplish the objective.

Measurement: The process of determining the extent some characteristic is associated with the student.

Module: Modules in the pilot Drafting and Business and Office Education curriculum modifications in the Occuptional Education Articulation Program have been designed to coincide secondary level training with post-secondary level similar areas of training.

Another method of developing modules might be for modules to represent an identifiable, complicated task or job area involving a number of sub-tasks such as "Electrical Systems" in Automotive Mechanics.

Norm-referenced Evaluation: In norm-referenced evaluation, measures are dependent on a relative standard. Measures compare the capabilities of one student to those of other students.

Objective: (See Performance Objective) A stated desired outcome of training or the end result of the job, task, or performance actions. Objectives referred to in this project will be terminal objectives, generally representing a specific job function.

Occupational Education: An organized sequence of learning experiences consisting of vocational theory, practice, and skills taught to students on a regular or systematic basis.*

*Reference: Standards of the Delegate Assembly (Atlanta: Southern Association of Colleges and Schools, Commission on Occupational Education, December, 1972) p. 12.

Outcome-referenced Evaluation: Outcome-referenced, or criterion-referenced, measurement provides a standard of achievement for the individual as compared with specific behavioral objectives and therefore provides information about the degree of competence attained by the student.

The outcome-referenced measure is a performance or other measure based upon a performance objective, the accomplishment of which measures attainment of that objective.

Performance: Performance is used in this project to refer to a job or task which results from a set of sequential actions or steps.

Performance Actions: A series of steps, generally arranged in a sequence ordinarily followed, which when completed may result in the accomplishment of a performance objective (performance of a task).

Performance actions may be referred to as a set or sets of skills, functions, or steps. V-TEC (Vocational-Technical Education Consortium of States) catalogs generally describe performance actions in the "performance guide" of their format.

Articulated, Performance-based Instruction Guide: A comprehensive collection of performance objectives, performance actions to obtain those objectives, suggested hours for instruction (for planning purposes), performance standards, related technical information, and outcome-referenced measures, as well as general secondary level and post-secondary level descriptions of similar courses for the purposes of aiding lateral and vertical articulation concerning the subject area.

Performance-based Instruction: Performance-based (competence-based) instruction is based on the competencies or tasks performed by on-the-job workers. Everything in a performance-based instruction system is made public beforehand. There are no surprises for student, teacher, counselor, or employer. When the student begins a program, information is available to tell the student exactly what competencies are expected to be developed as a result of the instructional program, how and against what standards or criteria the student will be evaluated, and how the student's competencies will be communicated to the student, instructors, and to employers. A performance-based instructional system tells the student exactly what the student must learn, teaches the student that skill or knowledge, and then tests on mastery of that specific competence.

Performance Objective: A statement in precise, measurable terms of a particular behavior to be exhibited by a learner under specified conditions. It possesses each of the elements or characteristics specified below:

Conditions under which the performance is to take place.

Behavior Desired or expected of the student (things to be done, the performance desired).

Standards to determine how well the performance is to be done (criteria).

Performance Test: A performance test requires the student to demonstrate (master) the desired behavior of the objective (accomplish a job-like task) under controlled conditions and according to predetermined standards. The controlled conditions allow the student to demonstrate the desired behavior and the conditions remain consistent from student to student.

Skill: Primarily, skill refers to overt, observable performance, however, it is recognized that there are covert skills required in some performances.

Step: Step is used to refer to a task or action, generally as a sequence of steps involved in the accomplishment of a performance objective or job.

Systems Approach: The systems approach to instruction emphasizes the specification of instructional objectives, precisely controlled learning experiences to achieve the objectives, criteria for performance, and evaluative information.

Task:	A task is a set of skills (set or sets of functions, actions, or steps) the student must perform to accomplish the job (training). A task may be described as a logically related set of actions necessary or required to complete the job objective. Several tasks could be referred to as a duty.
Task Analysis:	Task analysis is breaking down a learning task (objective) into component tasks each of which must be mastered as a prerequisite to mastery of the total job.
Task List:	A listing of tasks (performance objectives) performed by incumbent workers (students in training) within a domain of interest (course of study).
Test:	An event during which the student is asked to demonstrate some aspect of knowledge or skill is a test. It can be a single test item, but usually it comsists of several items.

SUGGESTED CRITERIA
SELECTION OF SCHOLARSHIP STUDENT
TO
GREENVILLE TECHNICAL COLLEGE
MACHINE TECHNOLOGY PROGRAM

There is agreement among the three secondary machine shop instructors that some following criteria should be applied to selecting the "most outstanding or worthy student" from the secondary Machine Shop program to be awarded a scholarship to the Machine Technology Program.

There, however, is a greater need at present to encourage secondary machine shop graduates to continue their vocational education at the post-secondary technical college level. Some of the reasons that students given for not accepting a scholarship or continuing their training include; not being able to afford the minimum costs of books or travel that accompany scholarships, the desire for immediate employment and earning, etc.

Appendix G

INSTRUCTIONS FOR ANSWERING OUTCOME-REFERENCED TEST ITEMS

Typically, eleven (11) different types of outcome-referenced test items may be used in the competency test.

1. True-False
2. Completion (Fill-in Blanks)
3. A Combination of True-False and Completion
4. Multiple-Choice
5. Matching
6. Identification
7. Short Answer
8. Long Answer
9. Program Product of Performance Test
10. Simulated Performance Test
11. Actual Performance Test

An example of each type of test item is included. Carefully study the illustration test item and the directions for answering the question. These directions will not be given again. Your test questions may vary slightly in the format, however, the instruction should be applicable. Where necessary, the instructor will supplement these instructions for answering outcome-referenced test items.

Do not guess. Guessing does not add to your knowledge, even if you happen to guess right. If you do not know the answer skip the test item and go to the next question. Remember: Enter your answers in the blanks provided on the separate answer sheet, if used.

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1. TRUE-FALSE

Directions: Read the statement carefully. Decide whether it is true or false. Answer by marking T or F in the blank provided to the right (or, if answer sheet requires, mark "X" in the appropriate (T) or (F) parenthesis, or "circle" T or F).

Example: Lumber shrinks across the grain of the board. (T) (F)

2. COMPLETION (Fill-in Blanks)

Directions: Complete the statement by printing on the blank line the word or words which make a complete and correct statement.

Example: Proper edge spacing will restrict __?__ and ensure good weld penetration. distortion

3. COMBINATION OF TRUE-FALSE/COMPLETION

Directions: If the statement is correct, in the parenthesis mark (T) or answer true, as required. If the statement is incorrect, mark (F) in the parenthesis and fill in the blank provided with the appropriate word or term which, if substituted for the underlined word, would make the statement correct.

Example: A pantry chef usually is the head chef's first assistant. (T) (F)

sous

4. MULTIPLE-CHOICE

a. Directions: You are given three or four choices from which to make a complete and correct statement. In the blank answer space provided, write in the "letter" indicate the best choice.

Example: The head chef's first assistant is a ? .

b

a. junior chef
b. sous chef
c. pantry cook

b. Negative Answer Multiple-Choice

Directions: If the multiple-choice question includes the word EXCEPT, you should look for the choice that does not fit the question. Read the entire question carefully before you choose your answer.

Example: All of these could cause high starter current draw EXCEPT:

b

a. work starter bushing
b. bad starter relay
c. grounded field coils
d. grounded armature

5. MATCHING:

Directions: For each given item in the left hand column, match it with the appropriate item from the right hand column. Write the letters of the correct or best answer in the appropriate blanks.

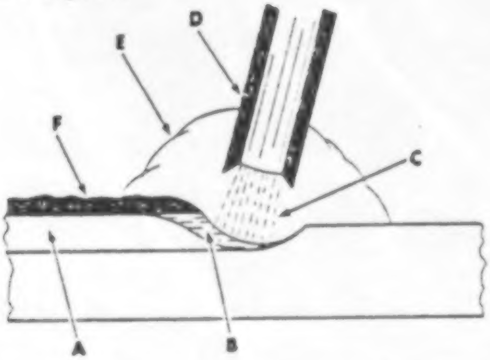
Example: Match these metric terms on the left with their proper equivalents.

b	deca	a.	thousands
c	meter	b.	tens
a	kilo	c.	units of length measurement

6. IDENTIFICATION

Directions: Identify each labeled part of the illustration below and write the name next to the appropriate letter in the blank provided.

Example:



a. base metal
b. molten metal
c. arc
d. electrode
e. gas shield
f. slag

7. SHORT ANSWER

Directions: Write the correct answer in the blank provided.

Example: What type of electrode is best for vertical and overhead welding? fast-freeze

8. LONG ANSWER

Directions: Using as few words as possible, write the answer to the question in the blank provided.

Example: What should be done if the electrode welds fast to the work?

"Electrode should be broken loose by twisting or bending the holder."

9. PROGRAM PRODUCT OR PERFORMANCE TEST

Definition: Concrete project or production accomplishments during training are used to test knowledge or skill. Typically, test pressures are missing and the student may have had help in completing the task.

Directions: Instructor will observe student during training and by checklist or rating scale will rate student's performance or knowledge.

Example: Given an oven for baking, food items, and necessary implements and equipment; load the oven with foods to be baked. All items on a checklist used to rate performance must receive an acceptable rating. The task must be accomplished within 15 minutes.

CHECKLIST

(Load Oven Racks)

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Gathered needed supplies.		
2. Used needed supplies.		
3. Pulled oven rack partially out while loading.		
4. Stacked oven shelves 8 inches apart for baking.		
5. Placed food on rack so that heat circulated adequately.		
6. Followed appropriate safety precautions.		

10. SIMULATED PERFORMANCE

Definition:	Contrived situation, resembling tasks the graduate will be required to do on the job. This form of test is useful for evaluating transferable skills such as reasoning, attitudes, and psychomotor skills necessary for occupational success.

11. ACTUAL PERFORMANCE TEST

Definition:	Exhibits the advantage of realism, but may be too late to help either the student or the vocational program correct failures.
Example:	Given an automobile with a leaking pinion seal, access to proper tools and equipment, replacement parts, and service manual; replace the pinion seal according to manufacturer's recommended procedures. The job should be completed within 2 hours. The manufacturer's specifications must be met and the completed job must meet the instructor's standards.

ANALYSIS OF SECONDARY INSTRUCTION TIMES

Instruction tasks and times have been described based on a State of South Carolina requirement that 3-hour blocks of instruction total 540 hours per year or 1,080 hours for two year programs.

Vocational programs in career centers typically are conducted on the 3-hour block time frame. Most vocational programs currently are offered for a two year period. Some vocational courses, such as office occupations areas, may be offered for only 1 or 2 hours of training daily.

While the "suggested instruction times" for the tasks in this guide have been allocated based on a 3-hour vocational instruction day, many vocational students in reality are not in the classroom for a full 3 hours. Typically, students must be bused to and from feeder high schools with transit times averaging about 15-30 minutes per trip one way. In addition, students typically are given at least one break during instruction and some instruction time is lost as students change clothes for shop work and then change back into regular school clothing. Add to this lost instruction time an additional time lost due to feeder high school activities, such as 'pep ralleys,' and the resulting vocational instruction day probably is less than 1.5 to 2 hours per day of actual instruction.

Realistically, a total instruction time of from 270 to 360 hours of vocational training probably is more accurate for a one year 3-hour block program than 540 hours.

It is important to recognize this potential situation as vocational instruction is planned and evaluated.

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BINDER DESIGN

(Occupational Education Articulation Program)

The binder design is simple and straightforward.

Two triangular figures, in balance, represent the two institutions participating in articulation.

Two levels of training are represented by the placement of the triangular figures and the identification of the two institutions.

Horizonal and vertical lines represent lateral and vertical articulation.

The diagonal across the design represents the progressive movement in career development for successful job performance.

The two figures are not closed when they face, but allow for interaction and are linked by the document title: Articulated, Performance-based Instruction Guide.